

July 1941

# TECHNOLOGY REVIEW

Title Reg. in U. S. Pat. Office

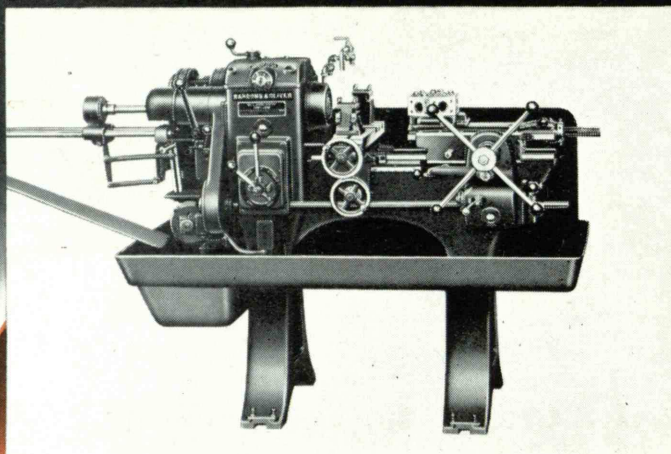


# technology review

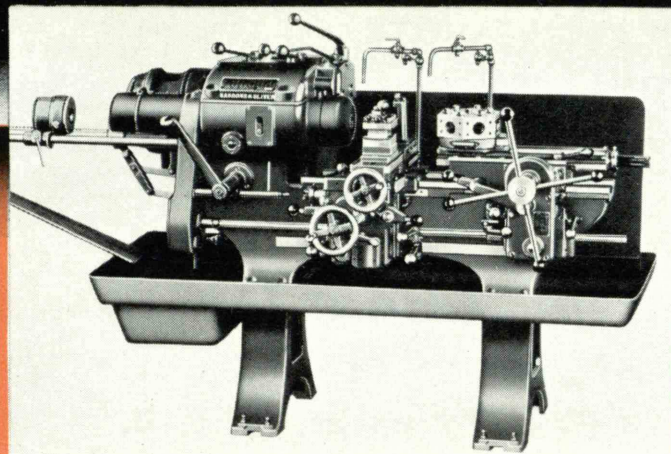
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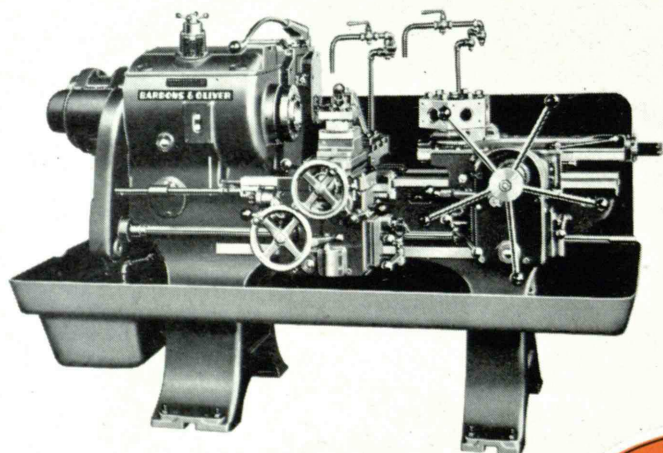
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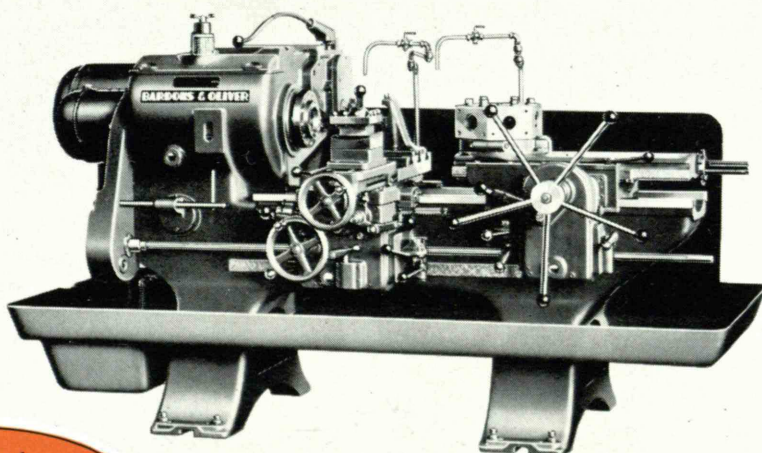
The above features are merely a few of the many recent and interesting developments that will repay further investigation and careful consideration.

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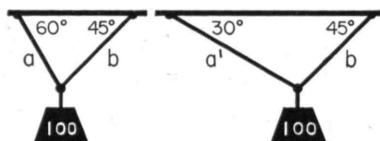


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## THE TABULAR VIEW

**Commencement.** — From the ceremonies attendant upon the departure of the Institute's seventy-fourth graduating class — that of 1941 — The Review in this issue presents three articles drawn from notable addresses of the occasion. PRESIDENT COMPTON's traditional address to the graduating class (page 415) was this year filled with particular meaning. Analysis of the present international situation from the point of view of scientific and technological learning is in itself far reaching; Dr. Compton's discussion goes farther, however, in its evaluation of what present events connote for young men and women. In the baccalaureate address (page 417) ANTON J. CARLSON, distinguished scientist and humanist, professor emeritus of physiology at the University of Chicago, cogently pleads for a broadening of the social base of science, which in itself might be expected to further the aims stressed by Dr. Compton. ROBERT E. WILSON, '16, President of the Pan American Petroleum and Transport Company, emphasizes in his commencement address (page 419) the importance of human values and comprehension of the influence of individuality in affairs.

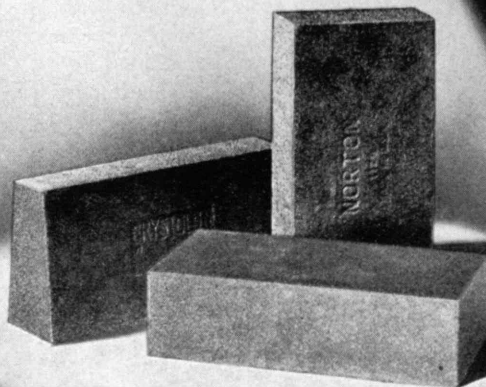
**Medical Means.** — The conferences which have come to be a notable part of Alumni Day at Technology each year have especial interest both as straws pointing whither blows the wind of events and as illuminating general discussions of the broad aspects of scientific developments which have wide influence. This year's conference, under the title "Science and Engineering as Allies of Medicine," well met both these qualifications. It brought to the speaker's stand three distinguished scientists, whose papers are presented in full in this issue of The Review. FRANK H. LAHEY, the noted surgeon who directs Boston's Lahey Clinic, surveys (page 422) accomplishments of science in medicine as they appear to one actively engaged in practice and widely acquainted with the field. Dr. Lahey has recently been elected president of the American Medical Association. To describe and explain some of the principal instruments which physicists have devised and which physicians have been quick to employ, the conference had Technology's Director of Applied Physics, GEORGE R. HARRISON, Rumford Medalist in 1939, inventor, author known for his ability to make the intricate interesting. Professor Harrison singles out for consideration (page 424) three particularly (Concluded on page 404)

*The Review is not published during the summer months following July. This issue, therefore, concludes Volume 43. Number 1 of Volume 44 will be published on October 27 and dated November. Readers who bind their copies are reminded that if they possess nine issues of Volume 43, their files are complete. An index to the volume will be ready on August 15 and will be supplied post-free upon request.*

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## MAIL RETURNS

### *Too Few Verbs?*

FROM FRANK C. CALKINS:

Having recently criticized a good many scientific manuscripts, I was interested in the article, entitled, "A Word for It," on page 342 of your June issue. The first and apparently the main point in the article is that scientific writers use more technical terms than are necessary. Another point is made, of course, but might perhaps have been more strongly emphasized: that much of the obscurity of scientific writing is caused by unskillful choice and arrangement of everyday nontechnical words. "And" is not a technical term, even in a patent, but it is one of the words most commonly misused. The long sentence you quote about the hour glass contains only two technical terms, "origin" and "rest-mass," neither of which need puzzle a person who read the original article; the obscurity of the sentence is due mainly to bad structure.

A more specific question is raised by your last paragraph. Adjectives have not struck me as overabundant in the manuscripts that I have criticized. Rather, the part of speech used to greatest excess has seemed to me to be the noun — especially the abstract noun. You quote Boder as comparing the proportion of adjectives to verbs. A better term of comparison might have been the total number of words. The ratio of adjectives to verbs can of course be decreased by increasing the proportion of verbs, and this result can be accomplished in a measure by using, instead of abstract nouns, the verbs from which those nouns are derived. In short, it seems likely that scientists use too few verbs rather than too many adjectives. . . .

Washington, D. C.

### *Roses*

FROM BEVERLY DUDLEY, '35:

It is essential that I take a few minutes in an otherwise busy day to offer you (symbolically, of course) a handsome wreath of roses for the June issue of *The Review*. Each and every one of the articles was a prize, and the organization, selection, and editing of the various articles did much to enhance each story and produce a more effective issue as a whole. . . .

New York, N. Y.


## THE TABULAR VIEW

(Concluded from page 402)

important tools which medicine has available as a result of the physicist's explorations. Discussing the future opportunities of the physical sciences in medicine, DETLEV W. BRONK, the scholarly chairman of the department of physiology and biophysics of Cornell University Medical College, stresses (page 426) the interrelation essential in beneficent science. For readers who wish to go farther with the topic, MARGARET PAIGE HAZEN of the Institute Library provides (page 428) a thoughtfully compiled reading list.

**Cover Club.** — To the Cover Club in June came CHESTER H. POPE, '09, who is followed this month by WILLIAM G. DE HART, '44.

**Retrospective.** — As Volume 43 is concluded, *The Review* offers thanks for the faithfulness of Class and Club Secretaries and for the constancy of Editorial Associates who have assisted in providing readers this year with added pages equaling an extra issue.



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*A tapestry of bees*

*Edwin Way Teale*

VOLUME 43

NUMBER 9

# THE TECHNOLOGY REVIEW

TITLE REGISTERED U. S. PATENT OFFICE

EDITED

AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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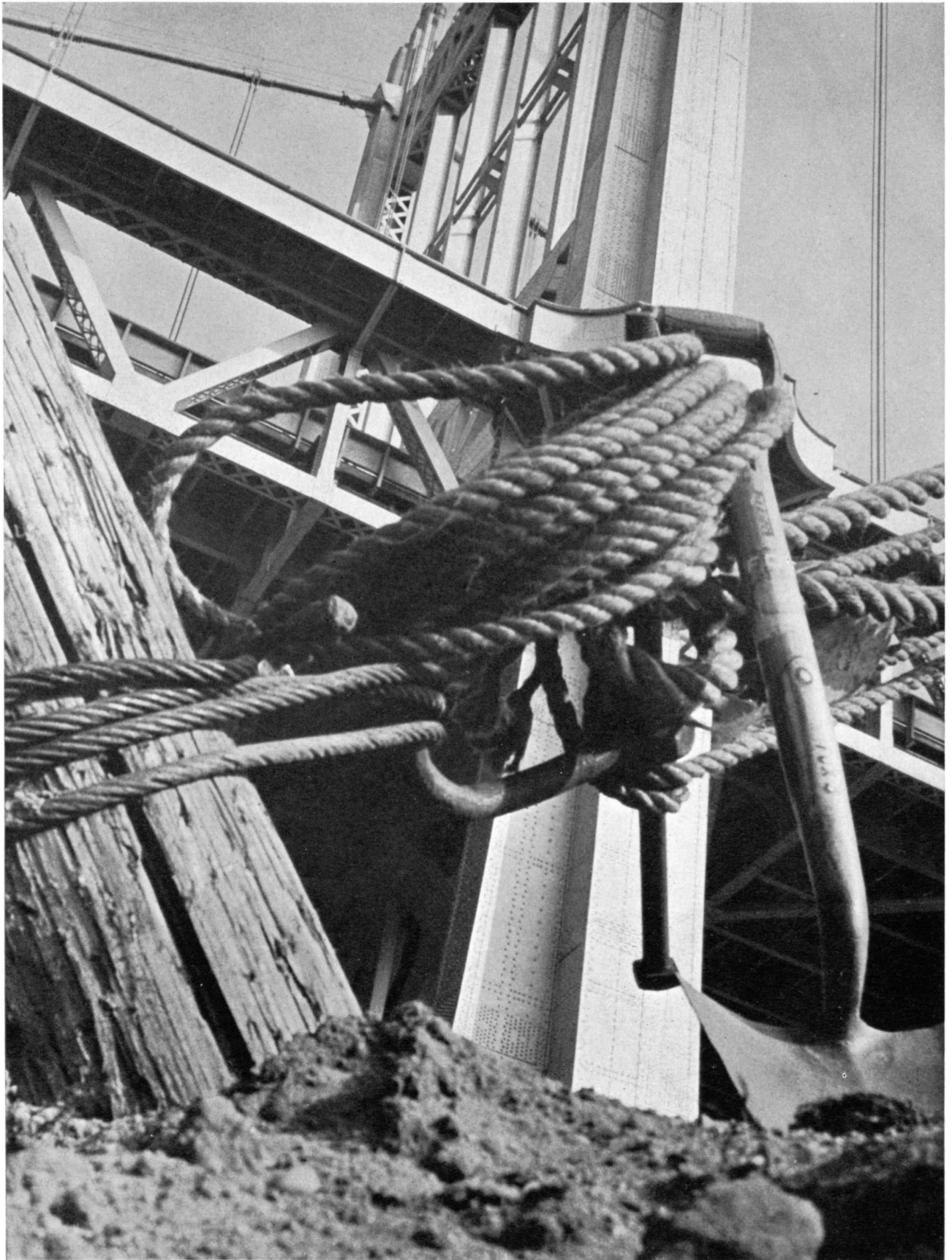
*From a photograph by William G. de Hart, '44*

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Published monthly from November to July inclusive on the twenty-seventh of the month preceding the date of issue, at 50 cents a copy. Annual subscription, \$3.50; Canadian and foreign subscription, \$4.00. Published for the Alumni Association of the M.I.T.: Henry E. Worcester, President; A. Warren Norton, John E. Burchard, Vice-Presidents; Charles E. Locke, Secretary; Ralph T. Jope, Treasurer. Published at the Rumford Press, 10 Ferry Street, Concord, N. H. Editorial Office, Room 3-219, Massachusetts Institute of Technology, Cambridge, Mass. Entered as second-class mail matter at the post office at Concord, N. H. Copy-right, 1941, by the Alumni Association of the Massachusetts Institute of Technology. Three weeks must be allowed to effect changes of address, for which both old and new addresses should be given.

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*Strain against strain, that the bridge shall rise*

*Black Star*

# THE TECHNOLOGY REVIEW

Vol. 43, No. 9



July, 1941

## The Trend of Affairs

### *Camouflage*

SOME of us can remember the spectacle of wraith-like, zebra-striped ships slipping through the raw mists of the North Atlantic in 1917 and 1918. We may have wondered even then to what extent the striping did in fact bewilder the enemy. Today we can have no doubt that such a simple device as razzle-dazzle would be ineffective against a foe who can approach from below, from the side, and, most important of all, from above, and who can see with more than his own eyes — with the lenses of a camera which may be filtered to separate the razzle from the dazzle. If camouflage is of any present importance, a more technical approach is required. We may well agree with a British author who mourns that though feminine camouflage in the shape of the lipstick has had millions spent on it, the more serious camouflage of the present is a child suffering from arrested development.

At precisely this moment, then, special interest surrounds the appearance of a bulky, scholarly, interesting, and instructive book, *Adaptive Coloration in Animals*\* by Hugh B. Cott, lecturer in zoology and Strickland curator at Cambridge University. In it he demonstrates quite clearly that the devices of man "are merely rediscovered arrangements and applications of colour" long ago known in nature — and usually more specialized in nature. A parallel exists between the hunting disguise of a primitive man and the concealed machine-gun post of the enlightened citizen of today; and the policeman's white gloves were worn long ago by the polecat.

Cott's book is serious as well as entertaining. From a biological point of view, its chief importance may well be in the problems posed for the geneticist by its complete presentation of the facts of cryptic warning

and mimetic coloration. Much interest is in the experimental information the book presents on the degree of immunity provided by natural camouflage. This information is important, because adaptive coloration has often been singled out as a major object for attack by antiselectionists.

For our present purposes, however, discussion may rest on Cott's consciousness of the parallelism between the interests of his field and those of the *camoufleur*. The parallelisms are by no means complete. From a fully military point of view, the camouflage of mobile objects may have a close relation to the camouflage of the equally mobile deer or moth. But no animal remains stationary forever; no predatory beast has a co-ordinate map of the location of his prey. It is under such additional risks that camouflage must be provided for fortifications, for essential installations of various kinds, for industrial property.

In the application of camouflage to fixed objectives, the purpose of camouflage must be conceived properly. With the best bombing sight in the world, a bombardier must for success still enjoy several miles of level flight, must know accurately his altitude, his speed, his drift. Very small changes in any of these factors will cause him to miss. The first and most important way to make him miss is of course to shoot at him, to give his pilot some concern. Beyond that, if one can create in the bombardier's mind a moment's hesitation as to the precision with which he has selected his target, one may cause him to miss. For the creation of that hesitancy, camouflage of well-known objectives can best be justified. On the other hand, uncertainty will not cause him to miss the entire landscape; his bomb will still be released. Hence camouflage can scarcely be justified when the thing to be concealed spreads over a wide area and when a hit on any portion of it will cause equally serious destruction.

\*London: Methuen and Company, Ltd., 1940. xxxii+508 pages. 40s.



Within this framework we may find in nature every principle of camouflage which might profitably be applied today. Adaptive coloration in nature may be for concealment or warning and in either case may be a weapon of offense or defense. To scare the human enemy by human camouflage is hard, though perhaps not impossible. The bigger share of the art will be applied to concealment; moreover, though Birnam wood may again come to Dunsinane, it seems that camouflage will be more a weapon of defense than of offense.

From an optical point of view, visual clues are of four kinds: hue and tone, light and shade, surface and contour, and shadow. Each of these may be concealed or at least confused by methods already well known in nature. All must be concealed if camouflage is to be effective.

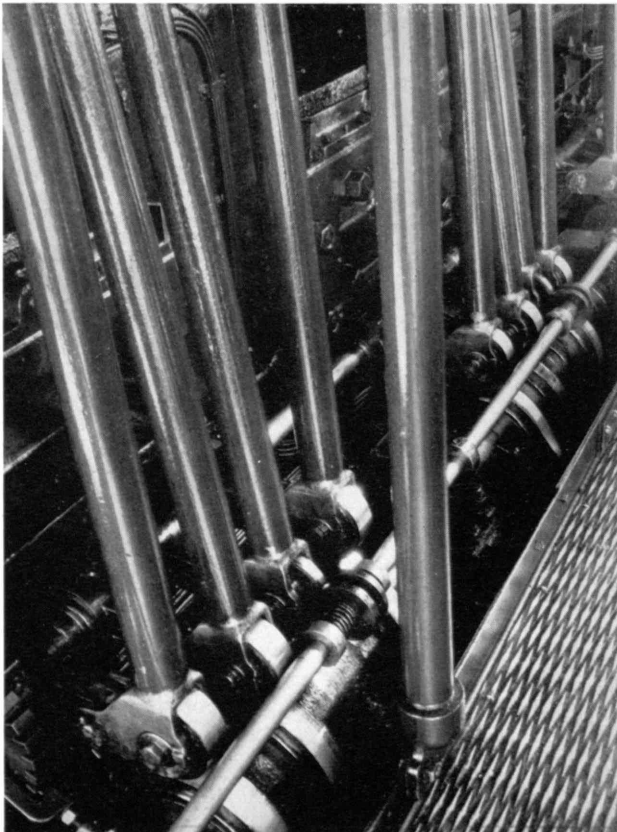
Most familiar of nature's protections is that of concealment by general color resemblance to the background — the green of the tree boa, the dun of the desert jackal. But man must make his color similarity prevail to the color-blind as well as to him of normal vision, in darkness or in light, and even in selected portions of the light band, such as the ultraviolet and especially the infrared, which may be used to trap the unwary *camoufleur* through photography. Nature has approached even this latter problem. Some tree frogs, for example, whose green color is due to a combination of pigment and structure, have skin which, in an infrared picture, looks as though it were colored by chlorophyll. In other words, the concealment is quite as good under infrared light as it is under normal light, if

not better. This fact is significant, if, as many naturalists believe, there is a possibility that some animals — owls, for instance — have a visual range which extends to, or within, the infrared region of the spectrum.

Even when a body is the same color as its background, however, shade will cause it to be detected, for shade will give the appearance of projection or depth. Place a white object against a white background and then so light the object that portions are in shade. There is no device by which such parts can be made white enough for concealment, since nothing is whiter than white. Let the object be brown and it will then be conspicuous, but in a lower key. With this lower key, the effect of shade and light can be counteracted. This is of course the reverse of the art of the painter, who, by use of light and shade, "creates upon a flat surface the illusionary appearance of roundness." By countershading surfaces not normally directed toward the source of light and by counterlighting those in shade, we may create something approaching optical flatness. Airbrush accuracy of shading is seldom approached in nature, but such accuracy is quite unnecessary. Seurat, the greatest of the pointillist painters, showed how easily any effect of color or shading could be produced by proper selection of combinations of dots of primary colors. Likewise in nature one may note the change in spacing of the hyena's stripes, from front to rear. At a distance, countershading is possible by many graded combinations which may in themselves be purely geometrical. The demonstration is so common in nature that further examples need not be cited, yet it may be noted that in some transparent fish, countershading is extended even to the opaque internal organs.

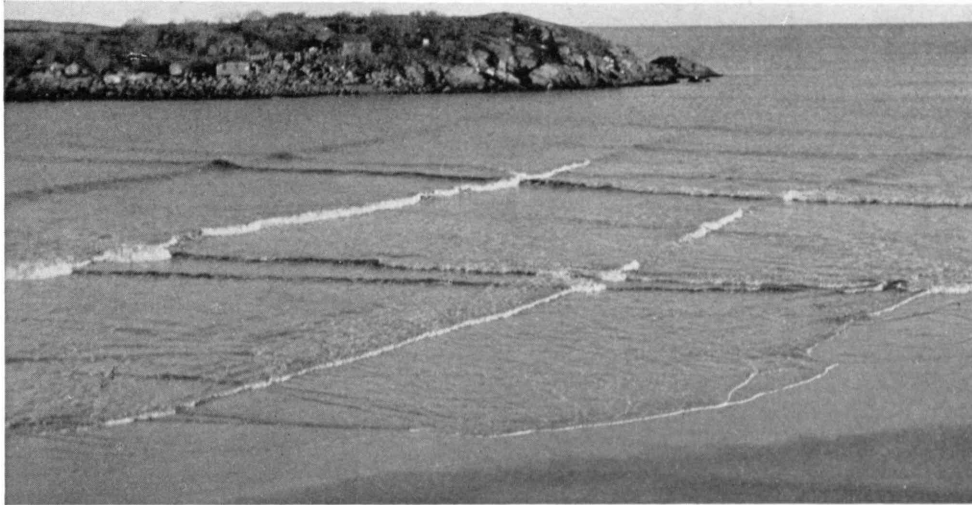
Objects have continuity of surface. For good concealment this continuity must be destroyed, and it frequently may be by patterns based on a psychology which says that if the eye of the observer is drawn to the patterns, it will be diverted from the shape which bears them. To be effective, such patterns must evidently contradict the form and not follow the anatomy. This aspect of camouflage was the dazzle of the last war. Of the results then or of the timid painting of today, Cott has low opinion. Disruptive painting, he says, "must be carried out with courage and confidence, for at close range objects properly treated will appear glaringly conspicuous. But they are not painted for deception at close range, but at ranges at which big gun actions and bombing raids are likely to be attempted. At these distances . . . mere blotches of brown and green and grey . . . blend and thus nullify the effect and render the work practically valueless. . . ."

With many cryptic animals the shadow may be more conspicuous than the animal which casts it, as is obviously true of camouflaged buildings as well. The character of shadow depends naturally on the surface on which it falls and is of great importance to those animals who seek protection from marauding birds or from the camera on wings. Animals of compressed form orient themselves to the sun to cast the least shadow, or tilt their wings in such a way as to conceal the shadows they cast. Animals of depressed form scoop themselves into their background. This is the German method of camouflaging roads with screens above them



G. A. Douglas from Gendreau

*Verticality in a section of a large Diesel engine*



*Rectangularity. The wild waves were all cross talking when Ervin Haskell Schell, Jr., son of Professor Ervin H. Schell, '12, photographed them about four-thirty one afternoon this spring from the North Shore above Gloucester, Mass.*

simulating the concealed road and making it appear void of traffic. Such a screen would cast a shadow save for the fact that gently sloping side screens merge it into the surroundings. Again, while actual shadows may be effaced, spurious ones may be suggested.

Cott is in this book acting primarily as naturalist and only incidentally as *camoufleur*. Hence he may be forgiven for failing to stress one very important point about human camouflage. The tricks which nature has provided for her progeny are in tune with a master plan. The form of the scarce-tissue moth would help it not a bit were there not specialized bark against which the moth can hide; the gray of the East African tree frog would be dangerous to it on a green surface. Nature has a plan. All too often human camouflage has started without a plan or has asked the *camoufleur* to exercise his tricks on a plan which in itself tended to defeat all the versatility of the man. If camouflage is important, the plan of an installation must accept the later application of camouflage as one of the important criteria in determining design.

All these considerations suggest that we may have come a long way in a new science since the days of razzle-dazzle. They show how readily the knowledge of an apparently unrelated field of science may be applied effectively in another area. The British have recognized this fact clearly enough. Julian Huxley tells us in his introduction that Dr. Cott has been "called on to apply the principles he has studied to such good effect in animals to the practice of camouflage in war."

### Identification Tags

THE migration of man has been kept track of fairly well for some time, an accomplishment made possible by visas, passports, police checkups, and other formalities induced by the crossing of frontiers. Other mammals, however, as well as birds and fish, are not known to visit a consular office previous to undertaking their journeys, and the charting of their complex and often immense wanderings must be done by the forcible attachment of identifications.

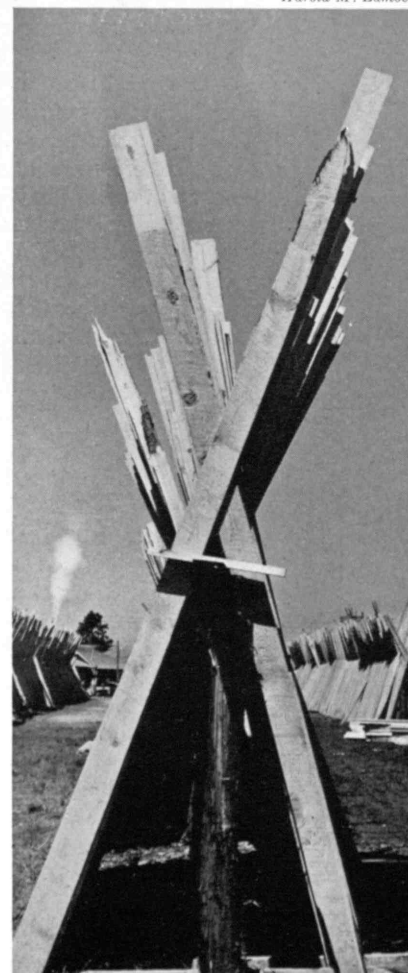
North America has at present about 2,100 bird-banding stations, the bulk of them in this country under

the control of the well-named United States Bureau of Biological Survey. At these stations approximately 300,000 birds are being tagged each year with aluminum bands. On the average, 20,000 of the tags are recovered. The number so far tagged all over the world runs well into the millions. This simple technique has been the primary means of uncovering the multitude of migration patterns now known and has also thrown much light on the length of life of birds and on their family habits. Although intensively used for a comparatively small number of years, the practice is quite old, the earliest procedure being to clip or paint feathers or occasionally to tie a parchment memorandum to the bird with silk thread. The first use of a ring or band dates from 1710, and as early as 1803 Audubon was marking birds with silver threads. The use of materials with relatively great durability and resistance to atmospheric attack is clearly important.

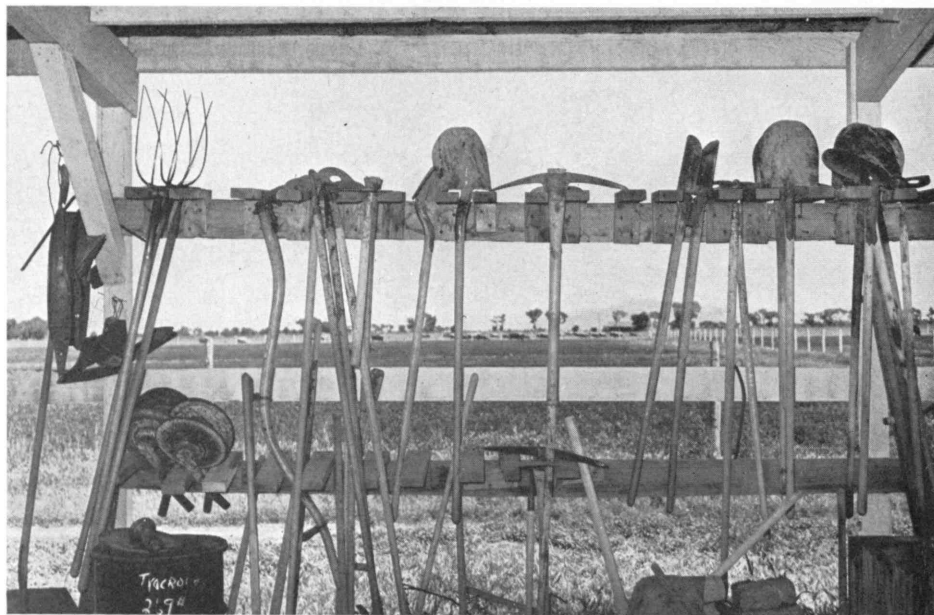
Among the more remarkable feats disclosed by bands is that the ruby-throated hummingbird drives straight across the Gulf of Mexico in a 500-mile jump and that the golden plover apparently migrates from Nova Scotia to South America in a single nonstop flight of 2,400 miles, losing about two ounces of body fat in the process. But the prince of wanderers is the arctic tern, which annually moves from the arctic to the antarctic via Europe and Africa, covering probably 25,000 miles in a year (about twice as much territory as the average United States automobile traverses).

The tagging of mammals and fish often presents some rugged

*Diagonals. The spot — stacking yard of a South Carolina sawmill*



*Harold M. Lamb*



F. S. A. photo by Lee

*From the photographic wealth of the Farm Security Administration's important record of life in America, The Review has been accorded a varied portfolio. Here are farm tools in an interesting array in Maricopa County, Arizona. Other bits from this portfolio are to appear in the fall.*

technical difficulties. Whales and swordfish, for example, do not lend themselves to trapping and must be harpooned with an appropriate identification. Some fish, such as the California herring, are too small to permit external attachment of a marker, and the tag hence must be inserted into the abdominal cavity after an operation. Since the small Pacific herring are used mainly for oil and meal, they are not cleaned individually. The custom has been to recover the tags in the reduction plants by passing the fish meal over a magnetic pulley, but such a method does not permit relation of a tag with an individual fish. An apparatus has therefore been devised which consists essentially of an induction coil through which the fish passes on a conveyer on its way to the reduction plant. The presence of a metal tag within the body of a fish (among 100,000 fish, less than one will be found to have a tag) changes the inductance, and this change, by means of a bridge circuit and an amplifier, activates a thyatron tube which in turn operates a fish-rejection mechanism that throws the unfortunate ichthyoid to one side.

### Bang Voyage

**T**HE chief danger that now faces a milling machine or a box of dried prunes on its way to England is, of course, an encounter with high explosive, but there is also the not inconsiderable and ever present risk of damage through the routine hazards of ocean transportation. From the time they are placed in the slings by stevedores working under pressure to get the ship away from the dock in the least possible time, to the moment they are deposited, probably with a hearty bang, on the bobbing deck of a lighter, export packages are subjected to far more severe conditions than those ordinarily met in domestic transportation. Aside from the crushing and shock loads during cargo handling,

export packages may also be chafed and rocked for weeks while temperatures fluctuate violently and the air is saturated with salt-laden moisture.

An illustration of the kind of treatment that shipping containers are expected to take is indicated by the Bureau of Explosives' test for the carboy, which is a twelve- or thirteen-gallon glass bottle housed in a wooden frame and used to carry corrosive liquids. To be tested, the carboy is placed in a cradle suspended on a 16½-foot pendulum, is filled with water, is pulled outward some fifty-five inches, and then is let crash against a concrete block. This procedure, it is stated, gives the carboy about the same treatment that it would get if rid-

ing in a freight car going at four miles an hour and suddenly brought to rest.

The covering of exposed metal parts with oil, grease, or rust-resistant coatings is routine transport procedure, but some use is also being made of absorbent materials like silica gel, which are placed inside packages in order to keep the air in them dry. And, as an acting trade commissioner at Singapore remarks, "Long experience has dictated the wisdom of using tin-lined airtight and moisture proof boxes for all perishable goods which are not individually packed in airtight containers."

In contrast with the domestic field, where fiberboard is probably the most widely used material for shipping containers, wood finds extensive use for ocean-going packages, although fiberboard and plywood are finding increasing application. Domestic containers of plywood may use a three-ply of 3/20-inch thickness or less when an export package would require thicknesses of 3/16 of an inch to 5/16 of an inch or more, and perhaps a five-ply. Nevertheless, ocean transportation can at least display a trial package which almost reaches the ideal of having no weight to carry and no material to discard at the end of the journey: Bales of rubber wrapped merely in rubber sheets have been shipped to the United States, making the journey with apparently satisfactory results.

On the other hand, the export containers for an airplane ordinarily weigh more than the plane they house. Usual practice is to box fuselage and wings separately, the fuselage being fastened to the floor of the wooden case at two of the three points where the plane normally takes stress, i.e., tail and landing gear or tail and wing roots. No other part of the plane touches the box. The statement has been made that, excluding trucking, the packaging of a Brewster fighting plane requires 150 man-hours.



## Science and Art

SIEGFRIED GIEDION is one of the foremost contemporary critics and historians of art and architecture; he is a resident of Zurich, Switzerland. Frank Lloyd Wright has been acclaimed abroad as the greatest American architect and one of the important men of all time in his profession; he lives sometimes in Spring Green, Wis. Eric Gill, recently deceased, was a famous English sculptor, graphic artist, craftsman. All three men have written well; recently all three have published books\* which throw light of different color on the same general subject.

The subject, one of endless discussion, is the division between thought and feeling, between science and art. Giedion, the most perceptively critical of the men, expresses the question best: "... the doubt as to whether science and art have anything in common. The question would not be raised except in a period where thinking and feeling proceed on different levels in opposition to each other. In such a period, people no longer expect a scientific discovery to have any repercussions in the realm of feeling. It seems unnatural for a theory in mathematical physics to meet with an equivalent in the arts. But this is to forget that the two are formulated by men living in the same period, exposed to the same general influences, and moved by similar impulses. Thought and feeling could be entirely separated only by cutting men in two. . . . The degree to which its methods of thinking and of feeling coincide determines the equilibrium of an epoch. When these methods move apart from each other there is no possibility of a culture and a tradition. These are not deliberations remote from our subject: . . . it was just this unfortunate schism between its thought and feeling which struck down the magnificent power of the nineteenth century. Out of such a schism come split personalities and split civilizations."

The three books are all important books, and here we may concern ourselves only with the manner in which they approach this one problem. Gill found the easiest way out. In his early life he was determined to co-operate with science and its child, the machine. The task became too hard, and his retreat — which he defends

\* Giedion, Siegfried. *Space, Time and Architecture*. Cambridge: The Harvard University Press, 1941. Pp. xvi+601. \$5.00.

Gutheim, Frederick (editor). *Frank Lloyd Wright on Architecture*. New York: Duell, Sloan and Pearce, Inc., 1941. Pp. xviii+275. \$3.50.

Gill, Eric. *Autobiography*. London: Jonathan Cape, Ltd., 1940. Pp. 283. 12s. 6d.

*The nameboard of an Ohio town restates the problem which has engrossed philosophers: How shall we incorporate Utopia?*

with vigor and brilliant writing as well as with brilliant accomplishment in the handicrafts — was complete. He simply fought the singlehanded battle against the hands of the machine. His position was at least clear; where it will leave him as an artist for posterity may not be so clear.

Frank Lloyd Wright, on the other hand, has asserted with vigor that the architect must accommodate himself to the machine, that in an artist's limitations lie his greatest opportunities. Yet one detects in his writing a species of self-hypnotism: If ever there was an architect who talked about using the machine while virtually his every act belied the talk, it has been Wright. For the laws of structural or heating engineering he has slight respect. He often places his own intuition above the accumulated knowledge of science. Intuition is not always wrong, and the foregoing remark therefore is less a criticism of a great man than a statement that his work is in contradiction to his teaching and that he, too, has not solved the riddle.

Finally, what would Giedion himself propose? He starts clearly enough: "The problem of today is not to popularize science. What our period needs much more than this is to gain an understanding and a general view of the dominant methods in different fields of human activity, recognizing their differences and their likenesses." He also says, "The methods of science, are of more concern to us now than any of their separate results."

Yet this is nearly as far as he is able to take us. An interest in construction leads him through a brilliant exposition of the development of the steel frame and of the principles of Maillart's bridges (which, by the by, are more appreciated by architects than by engineers). When Giedion must single out architects who seem to him to carry forward in the right direction, he comes back to the great names, such as Berlage, Le Corbusier, Gropius, Aalto. But important as the contributions of each of these men may have been to architecture per se, little application of scientific method



F. S. A. photo by Rothstein

is visible in their work. There is undoubted admiration for science, a wishful straining toward science, but in the last analysis their most brilliant results (as well as their worst failures) have been obtained through intuition.

Giedion himself fails to note the importance of the panel, as indicated by the brilliant design of the broadcasting studios in Hilversum, Holland, where a full collaboration of architects and engineers brought kudos to all. But the fact probably is that in the present complexity no man can be a full man. The scientist cannot run everything, nor can the artist, nor can the politician. The most that can be asked is that each in his cell try to understand the methods of the other before he complains about the results.

### *Wedding*

SCIENCE and art have been wedded at the Institute in recent months, as a result of a long period of preparatory study, and the event bids fair to provide sculptors with a medium and a method of using that medium which will overcome several of the chief obstacles to widespread individual possession of the works of their art.

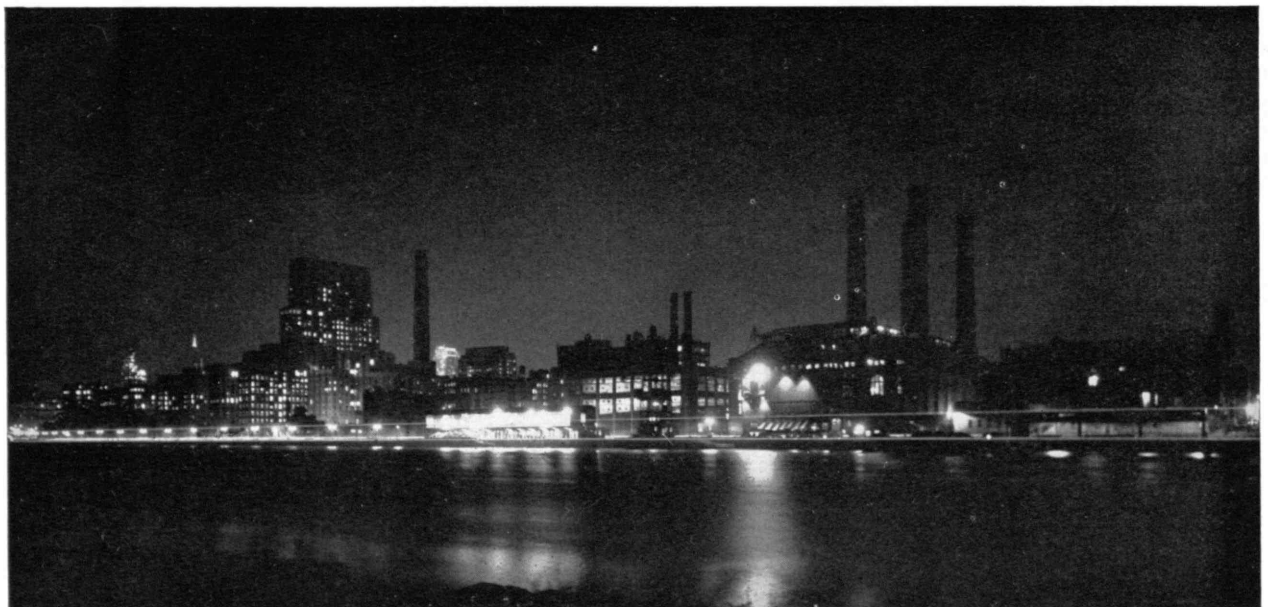
The story of this wedding had its start eight or ten years ago in the inauguration of research into ceramics by Frederick H. Norton, '18, Associate Professor of Ceramics, and continues in the present with the translation of the results of Professor Norton's work into sculptural methodology by George Demetrios, the noted American sculptor, who is at present a guest of the Institute. Mr. Demetrios, a member of the faculty of the Pennsylvania Academy of Fine Arts as well as an artist in his own right, has been busy in the ceramics laboratories of the Institute for some months. The end of this continuing story cannot yet be written, but suggestions of it appear in the recent visits of other sculptors to the Institute and their study of the method.

We could have given this wedding a far earlier start;

we could have said that the preliminary conversations about dowry and so on were begun in the Renaissance. Or, wishing to be really emphatic about it, we could have dated the wedding all the way back to Classic Greece and located prognostications of it in the ancient town of Tanagra in Boeotia, famed for a battle in 457 B.C. and more famed for the terra-cotta figurines found first in its graves. These miniature statues, made of baked and painted clay and showing ancient Greek citizens in various poses and activities, supposedly had some ritualistic significance. Found in graves in many parts of the country, they are called by the name of the town where archaeologists first encountered them.

There is thus nothing new about making molds of a piece of sculpture, producing from them a hollow clay replica of the piece, and baking the clay to make it durable. Such terra-cotta work is very ancient. What are new in the recent events at Technology are knowledge of the material, and the power of control which such knowledge brings. These are Professor Norton's contributions. Their significance to sculptors and to those who appreciate sculpture will later appear. For the moment, we are concerned with how Professor Norton, who is by way of being a finished sculptor himself, established the rational basis on which such good results are being built.

One of the great barriers to the use of terra cotta in the fine arts has been the fact that clay when fired will shrink. Shrinkage in itself is not always a serious trouble; unpredictable or nonuniform shrinkage, however, is a very bad thing. The qualities of the clays composing the slip, or fluid mixture, placed in the mold determine how much the product will shrink upon being fired. Hence, knowledge of the properties of different ceramic materials can be utilized in the composition of slips whose shrinkage can be predicted. One such mixture worked out by Professor Norton consists of 25 per cent quartz, 36 per cent feldspar, 18 per cent ball clay, and 21 per cent China clay. (Continued on page 436)



*Night comes to the city water front.*

*Paul J. Woolf*



# No Subtleties to Perplex

## *This Year's Graduates Face Issues Clearly Drawn, in a World Where the Defense of Human Rights Calls for the Strong, Simple Virtues*

BY KARL T. COMPTON

*President Compton's address to the Class of 1941 in the Institute's seventy-fourth commencement — direct, thoughtful, and stimulating — is presented verbatim below.*

SOME years ago I overheard a discussion of the effect of the motion-picture habit on the characters of young people. A dean of one of our great universities defended the movies on the ground that their portrayal of moral issues is generally so clear cut. The hero is always brave and loyal, the villain is always treacherous and selfish, and virtue is always rewarded. This dean said: "It is a great relief not to have to worry about subtleties which mix you up. The strong, simple virtues are the best."

I am reminded of that point of view as I think of your situation today. As compared with your predecessors who were graduated in the past decade, you face a world where the issues are clearer and the course is better defined. I do *not* mean to imply that your way will be easy, or that you have no problems. That implication would be far from true, for the further we achieve a level above that of the contented cow the more we must face problems, make decisions, and exert ourselves to carry through. What I *do* mean is that the day calls for the "strong, simple virtues," and you need not worry or lose self-confidence over such questions as: "Am I of any use in the world?" "Is the technological career for which I have prepared myself outmoded?"

Ten years ago the depression had upset confidence in the very foundations of our economic structure. We were told that unrestrained enterprise and technological progress had overbuilt production far beyond our capacity to consume the goods produced. We technologists wondered if we had any right to be alive, let alone do our job, as we heard and read the theories of those who argued that higher standards of living are assured by curbing production, not stimulating it; by making production more expensive rather than cheaper; by distributing wealth by laws without much thought of how this wealth can be created. So, ten years ago our graduates faced a world in which few of them seemed to be needed, and in which the tide seemed to be running against them.

Today the contrast is startling. No need in the country is so urgent as that for more and better technically trained men, no objective more important than increased productive power. And the pure scientist is suddenly found to be very useful, as is always so when affairs get away from conventional paths. If some of you who hope to practice architecture have not yet

felt such great pressure for your services, don't be discouraged, for, if anything seems certain in this uncertain world, it is that there is going to be a lot of housebuilding the world over when the present international mess is cleared away.

Perhaps it is not pleasant to think that this change in your favor has come because of war. I believe that it was coming *in spite* of the war, and that the present defense activity has only switched into temporary channels and stimulated a movement which was already under way. Witness the scientific research program of the National Association of Manufacturers, now in its third year; and the program of the new-products committee of the New England Council; and the recent rapid increase in the number of industrial research laboratories; and the activities of the National Resources Planning Board of the Federal Government; and the statements of farsighted labor leaders. These are all evidence, independent of the war, that people in important places have reacted against the panicky confusion of ten years ago and that they see in technological progress, in development, and in production, one of the essential elements of national prosperity — a prerequisite to any and all sound schemes for the economic betterment of every social group.

So, without further elaboration, I make the straightforward statement of fact: You are entering a world at a period of urgent demand for people of your professional abilities and training and under circumstances which give reason to hope that this opportunity is not a temporary war phenomenon but is an element of the solid structure of human progress. This fact should give you confidence and courage, two of the "strong, simple virtues."

But more is at stake today than your opportunity to find employment and satisfaction in knowing that your work is worth while. There are at stake over the entire world some of the most important achievements which men have won in their centuries-old struggle to learn how to live as a social group. And scarcely anyone, be he interventionist or isolationist, doubts that these world events include a threat to the institutions and privileges which we in America hold most dear. The only doubt is whether, if Germany wins over Britain, the threat to America will become acute within a few months or within a few years.

In this matter also I believe you of this graduating class to be fortunate, for here again are no subtleties to perplex. Once we really understand the issues, there is little question of our objective, namely, to defeat the

Nazi threat; the only question is of the tactics for best accomplishing this objective.

Here I wish to make one thing clear. We have no quarrel with Germany if she wishes to follow a *Führer*, or glorify the Germanic Aryan race, or teach her youth that only that is valid which enhances the purity and prestige of that race, or enter into advantageous trade agreements with other countries. These are matters of internal policy, and one of our democratic precepts, evolved through generations of hardship and frequent failure, is that each major group should have certain rights of self-determination. We may not approve of some of Germany's internal policies, but we can thank God we don't have to live under them. We may admire, and properly so, the efficiency and the zeal with which the German youth follow their *Führer*. But, as I said, these are internal matters, and the German people as a whole gain or suffer because of the government which they themselves have helped to create and permit to exist.

It was when Germany, through her Nazi leaders but with general support of the German people, undertook to impose her will upon other nations through threat of force and then through invasion, conquest, confiscation, and bloodshed, that her affair became an international moral issue. For if the world has learned any one thing by painful experience, it is that peace cannot be maintained if one nation invades another; conversely, however bitter the arguments between them, nations do not become involved in war unless one attacks the other. So perhaps the most tangible result of the first World War was a rather general acceptance of the conviction, of almost the strength of a religious tenet, that invasion of one country by another must at all costs be avoided. But Germany and her Axis partners have each separately been guilty of invasion for purposes of conquest within the past decade. They are the only nations of the world that have been thus guilty. They are now banded together to protect and enlarge their conquests through further threats and wars.

This again is a very clear-cut issue. There are no subtle considerations involved. There are conflicting factors, it is true, such as are expressed by frequently heard phrases, like, "most Germans outside of Prussia are lovable," "Great Britain has not always been fair and generous," "the Nazi youth movement has bred a race of fine physical specimens filled with enthusiasm," and so on. But these details are utterly insignificant in comparison with the main issue, which is the conflict between two utterly opposing ideologies. So we do not waver in our allegiance; we only wobble a bit in our efforts to be effective in its defense.

But look a little closer. The ideology of the totalitarian state appears as nazism in Germany, as fascism in Italy, as bolshevism in Russia, as control by the military clique in Japan. It is characterized by the dictatorial power of a group ruling over all activities in the country; a dictatorial power which forces the entire nation to work as a unit to carry out the objectives of this ruling group; a dictatorial power which permits no opposition either of rival political factions or even of private individual criticisms; a dictatorial power which ruthlessly maintains its supremacy by political assassination,

blood purges, and extensive espionage; a dictatorial power which indoctrinates its youth by elimination of free speech, free inquiry, and free information and substitutes propaganda, censorship, and controlled education designed to promote blind adherence to itself and prevent any questioning of its objectives or procedures. It is a doctrine that considers the individual to have value only as a servant of the state to carry out the purposes of the ruling power.

In our democracy, on the other hand, every citizen not only has the right to express his opinions but has the right to cast his vote and thus exercise his proportionate influence in the determination of the rules for protection and co-operation which are the laws of the land. It is a fundamental principle with us that minorities have privileges and protection, and that facts and truth shall not be suppressed or distorted in order to further policies. We hold that all men are equal before the law, and our goal has always been to open wide the doors of opportunity to all who have the urge to enter.

All of these rights can be summarized by saying that our social structure is liberal in the basic meaning of that word, emphasizing freedom. The totalitarian society is based upon conformity, its purpose being "the preservation and fostering of a community of individuals who are physically and mentally alike." I have often thought that patriotism is a sometimes overworked virtue; but there is no question that, in the present war, the issue is far deeper than patriotic adherence to this or that country; it is adherence to one or the other of these two totally opposing concepts of human rights.

And this mention of human rights leads me to a further thought. We have become so used to life as a free people in our democracy that one of the commonest of all phrases is, "I have a right to . . ." this or that. We speak of the right of free speech, the right to own property, the right to strike, the right to vote, the right to an education, the right to trial by jury, the right of way, and so on, and so on, almost ad infinitum. We have come to accept these rights as matters of course and year by year to invent new ones, like the right to old-age pensions and free hospitalization.

The basic statement of our political rights is in our Declaration of Independence: "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness. That to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed."

Now it took hundreds of thousands of years for mankind to formulate and make effective that immortal statement of human rights under a government. It took bloody wars to secure these rights, and we have had them only 165 years.

The point I want to emphasize is that, however much we believe *theoretically* that we have certain unalienable rights, *practically* we have them in one of only two ways; either we have won these rights, or else we had them given to us by someone else who won them for us. And in either case we do not keep them long if we do not defend and deserve them. We speak glibly of our many rights, because we (*Concluded on page 436*)



# A Broader Base for Science

## *More Widespread Understanding of the Scientific Spirit Is A Safeguard for Civilization*

BY ANTON J. CARLSON

THE mysteries of the starry heavens and the urgency of human pain appear to have been among the earliest incentives to man's venture into the realm of science. At any rate, the earliest written records of man's experimental and rational gropings toward understanding are in astronomy and human disease. An engineer may challenge this statement. It is likely that primitive man felled a tree across a stream for a footbridge long before he gave rational attention to the machinery of his body in health and in disease. But such primitive engineering feats are probably on the level with today's monkeys' using any available box or stool to reach a banana.

The men of the later Stone Age had acquired not a little engineering skill, if not engineering science, in the making of tools, in the construction of conveyances for water transport, in the erection of buildings for their leaders and temples to their gods. But these achievements seem to have been a mere flotsam on the current of life. At any rate, these tools and these buildings are now mere fossils. What these ancient engineers knew, and how they acquired their understanding, and why their early science failed to be perpetuated—all of this knowledge is gone with the wind, though the race endures.

The same comments can be made about the greater and more recent achievements in applied science of the ancient Babylonians, Egyptians, and Aztecs. Some men among these peoples must have had a respectable amount of understanding and skill in mechanical engineering, some grasp of the forces of nature. All this knowledge was lost. Nothing but ruins, like the fossils of earlier times, and the mummies of the ancient dead remain to stir the curiosity of the archaeologist. The reason for the total disappearance of understandings of nature and the loss of skills in modifying the environment does not seem to be lack of written records, or the complete destruction or dispersion of the people themselves. We find instances of the same total failure of acquired scientific understandings to survive in more recent times, when written records were made. I may cite one example from ancient Egypt and one from the China of but yesterday.

The Smith papyrus, translated by the Egyptologist, James H. Breasted, is estimated by him to date back some five thousand to seven thousand years before Christ. The original and ancient side of this remarkable script deals with medicine—with injuries of various parts of the body and how to treat them. The description of the symptoms of the injuries, as well as the recommendations for treatment, discloses a remarkable

amount of knowledge of human anatomy and human physiology. To be sure, on the reverse side of this papyrus are recipes for quack medical remedies of all sorts, formulas for sorcery, incantation against disease, and so on. But I am concerned here with the original truly scientific medical document. As far as we know now, this early knowledge of anatomy and physiology as applied to human injuries was completely lost. It therefore had apparently no effect on the subsequent development of science and medicine in Greece or in Egypt. We may presume that the knowledge was confined to the few. It was in the ivory tower, with no broad base in the life stream of the people of Egypt.

No surprise should be registered at the medical quackery and the religio-medical superstitions recorded on the reverse side of the Smith papyrus. Possibly this ancient period of relative medical understanding was followed by a longer period of medical dark ages in ancient Egypt. But, even if this was the case, medical superstition and quackery are as tenacious of life as are other customs of the jungle: Witness the persistence and flourishing of similar practices in our own day side by side with the results of three hundred years of medical science, medical research, and scientific medical practice. Indeed, misconceptions, frauds, and quackery may flourish in the realms of medicine for a thousand years because of human hope and human credulity, as is instanced by the taking of powdered tiger bone for heart disease by countless generations in the Orient. The mistaken or fraudulent claim of the chemist that he has synthesized a new compound, or similar baseless claims of the engineer that he has devised a new and sure method of smoke control are, in the nature of things, more quickly deleted from the human scene.

My next example may cause surprise, since some may not be aware that vaccination against smallpox was discovered by the Chinese several hundred years before Jenner and the milkmaid in the then Merry England. The Chinese vaccinated effectively against smallpox by taking the dried pox scale with its attenuated virus from a patient and rubbing this powdered scale on the mucous membrane of the nose or mouth. A mild case of smallpox develops, which gives immunity. In the same way, somehow, they had discovered the efficacy of dried, or powdered, seaweed—or even fresh seaweed—and its iodine against simple goiter. Certainly these discoveries did not spread to any extent even in China, though recorded in the Chinese books on drugs and therapy. The discoveries, really scientific discoveries, remained in the ivory tower and for all practical purposes were lost to the world.

These examples from the past do seem to show that, for the endurance and the effective value of science, a broader base than the ivory tower is indicated. The next question is this: Is such a broad base possible? Is the average man or woman — the common man — capable of understanding, of being conditioned to, the spirit and the method of science? The fact that to date the significant contributions to science, the important new discoveries in science, the great generalizations in science, are the work of the relatively few conspicuous leaders in science, has led to the easily accepted view that the rank and file of mankind are either not able or not sufficiently interested in science to understand and follow its spirit and method.

To my way of thinking, nothing about the scientific method is so abstruse or mystical that it cannot be understood and mastered by every man and woman of average mentality. Conspicuous use of the scientific method in securing new understanding is a different matter. For some time to come, that function, that privilege, will probably be only for the few with sufficient curiosity, ingenuity, and drive to defy all obstacles.

As things seem to me, it is going to be more difficult to condition society to the spirit of science, that is, to absolute truthfulness. The primitive thalamus has as yet too much influence on the conspicuously human part of the brain: the cerebral cortex. Armchair dicta, social and political dogmatism, pretense at knowledge and understanding, call for less work and less worry than does the establishment of facts by adequately controlled experiments and rechecked observations.

I am a physiologist, not a prophet. According to William James there are, still untapped, "lakelets of energy" in the human brain machinery, ready for more intense, if not more intelligent or better, human behavior. Maybe so, but I doubt it as a universal proposition. We can, however, grasp the scientific method without tapping these hypothetical lakelets. Wherever we go, the *going forward* will not be speedy, judging from the rate of man's evolution. It may be too speedy if the

path leads down. As a Roman poet put it long, long ago, "*Facilis descensus Averno*," — easy the road down unto hell. Our esteemed colleagues, the philosophers, have a perennial debate on the question: "Is man a *rational animal*?" Is there, as yet, any evidence of any activity of any man that can be labeled "pure reason"? Strict definition of terms and a small dose of the theory of relativity would in all probability terminate this debate, with the following conclusion: The behavior of the average normal man, including the man of science, is relatively rational in the sense of awareness of facts, motives, and choice, during varying parts of his hours awake. But probably nothing like pure reason (that is, behavior machinery free from conditioning and from affective mental states) is found in any human action.

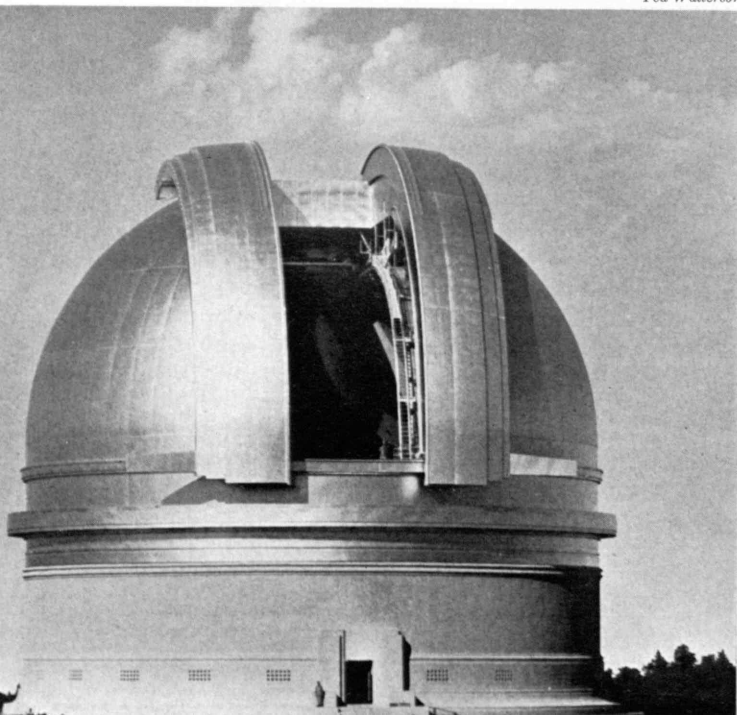
If our citizens understood the scientific way of establishing facts and the identity of the scientific spirit with honesty and truth, our leaders would not get to first base by promising us complete freedom from want and complete freedom from fear, through any political, social, or economic order. The dreamers of the past put that goal in heaven. It can be approached but never reached on earth by providing freedom to work and to enjoy in full the fruits of one's labor. For it is certain that such calamities in nature as earthquakes, tornadoes, floods, droughts, consuming fires, and killing frosts will create both want and fear among men in the coming years. Some accidents, disease, and pain, some greed, hate, and violence will be with us to the end of time. It is the duty and the privilege of science to decrease the want and fear created by man. It is the duty and the privilege of science to inject understanding, reason, and approximate justice as factors in the social evolution of tomorrow. To do so, I think science must descend from its ivory tower and reach the understanding of the common man.

Since science and scientific research are calling for more and more financial and moral support from society, it would seem to go without saying that in return science owes society the service of education in science so that such support may be given with joy and intelligence. To my way of thinking, a broader base for science in society is urgent and needed: (a) for the persistence and progress of science itself, and (b) for the advancement, safety, and happiness of man. The first point is of no consequence if the second is not true. But obviously if science does contribute to the advancement, safety, and happiness of man, the persistence and progress of science itself become highly desirable. My second proposition is challenged by many people who confuse the primary function of science, which is the increasing of human understanding, with the misuse by stupid man of the practical inventions derived from our increasing scientific knowledge. In the minds of some people, this misuse has reached the state of calling for a moratorium on science for the welfare of man. These people charge science with the following misdemeanors, if not actual major crimes: (1) Science facilitates violence, robbery, and murder. (2) Science promotes and brutalizes war. (3) Science promotes or intensifies unemployment. (4) Science speeds the depletion of some of our natural resources. (5) Science creates or promotes industrial disease of man.

(Continued on page 438)

*On Mount Palomar, this Twentieth Century expression of one of man's first incentives toward science—his desire to learn the mysteries of the skies*

Ted Watterson





# Individuals and Incentives

## *Constructive Convictions and Enthusiasm for One's Work Are Essentials for Successful Life*

BY ROBERT E. WILSON

THE graduate in science or engineering today understands the forces which make the turbine and the motor operate, or knows how various atoms will react under given conditions, or can predict the behavior of electrons or molecules, given all the forces which act upon them.

Yet he goes out into a world where neither turbines nor motors, atoms nor molecules, are the most important things with which he must deal. If he is really to achieve during his chosen career, he must give a larger share of time during the next decade to recognizing the basic importance of individual persons and trying to understand what makes them act and react as they do, under the various forces and environments to which they are subjected.

Intense concentration on the exact sciences and on the material side of the world's work is bound to make one less attentive to the vital part which individuals play in the world in which we live. The present war must make us conscious, however, that all the achievements of science and engineering may be jeopardized, at least as far as any real benefit to humanity is concerned, by powerful and selfish individuals' misusing them, especially if those individuals can persuade sufficient others to follow. Many of us in business have seen one person in a position of management, or a misguided group of workers, nullify the best efforts of thousands of others and bring a once prosperous establishment to ruin. A business enterprise, large or small, depends very largely on teamwork, and a few unco-operative individuals can demoralize any team. How to get the best out of each individual and work him into a hard-hitting enthusiastic business team is one of the most interesting and important jobs of management.

In the study of individuals and their behavior, as in the study of a new machine, the first question we must ask is, "What makes the wheels go round?" Some of the forces which act on individuals and help to determine their behavior are internal in nature, or what we may term "convictions"; others are external in origin, or "incentives." In the long run, the organization of society which will accomplish the most is that which gives its citizens the convictions and the incentives best adapted to make each individual contribute his best efforts — be they intellectual, manual, or artistic — toward the work of the world.

Consider first the question of convictions: What are some of the constructive and destructive convictions, and what can be done to encourage the constructive ones? Included among the most important are these beliefs: (1) that a real chance to achieve exists, and that success

depends mainly on one's own efforts and ability; (2) that there is no substitute for work, and in the long run a life filled with work is more enjoyable than any other existence; (3) that not only is honesty the best policy for the individual but, by and large, American business and business leaders are honest; (4) that the American system of democracy and free enterprise is the best yet devised, even though it is still subject to substantial improvement; (5) that merely making money and achieving power will not give enduring satisfaction unless they are accompanied by abundant and unselfish service to fellow men.

A man armed with these convictions, with enthusiasm, and with reasonable ability is well on the road to success.

Systematic attacks on such beliefs are the worst and most subtle form of sabotage, yet one which is being practiced widely by the enemies in our midst. I cannot imagine a man less likely to succeed, or to be happy, or to be a useful member of society than one who has let himself be led to believe that success depends largely on pull or luck, that most business is crooked, and that our American system is merely an out-of-date folklore.

On the other hand, we cannot expect budding scientists to accept certain beliefs merely because those beliefs, like spinach, are supposed to be good for one. We must be able to convince those scientists that our beliefs are sound.

Let us next consider the external forces, or incentives — the other group of influences which largely determine the actions of individuals. In classifying incentives as external forces, we must not forget that what constitutes an incentive to one man may leave another cold; although incentives may be of external origin, therefore, they still depend to no small extent on the same internal background of attitude and belief which we have been discussing. American companies operating abroad are surprised to find that incentives which appeal to the American worker often fall flat when offered to the native. Even incentives, therefore, must be appraised on the basis of the kind of individuals to whom they are supposed to appeal.

An engineer making an appraisal of the efficiency of the incentives in any given society naturally favors the pragmatic test of success or failure rather than the endless discussions of the theories in the field of political science — if, indeed, this field at its present stage of development can be termed a science. Even the pragmatic test has its pitfalls, however, because we must first define what we mean by success or failure, and then we must be sure that the failure of a given form of society

was due to inherent weaknesses and not to other factors unrelated to its type of organization. We must also remember that temporary success for a few years or even for a generation does not prove that a given form of organization is free from fundamental weaknesses which may sooner or later undermine it.

If we were to judge a society by the magnitude of its advances in thinking and artistic endeavor, the civilizations of ancient Greece and Rome would stand favorable comparison with any subsequent form of government; yet we know that while the wealth and leisure of the few were largely responsible for the desirable results, these results were generally acquired at the expense of slave labor resulting from military conquest and did not yield either material comforts and happiness for the average man or an enduring base for further progress. Strong military powers since that time have played large parts in the spread of what we call civilization and even in the development of science and industry, but again military might and ambition have always seemed to carry the seeds of eventual destruction.

No economic system is an end in itself; rather it is something which has been evolved in an effort to satisfy human wants. I believe there are few persons today who would quarrel with assuming as the principal criterion of success for any form of organization of society the amount of education, leisure time, and material and spiritual comforts which are generally available to the common man. To provide adequate quantities of goods for such a society two principal things are essential: first, the ability and willingness of the great mass of people to work hard to produce the necessary goods; and

second, the provision and maintenance of adequate facilities and tools to supplement and magnify the efforts of the individual worker without requiring excessive human effort. Both of these essential elements require the proper incentives to insure their uninterrupted functioning.

Let us consider first the problem of getting continued and intelligent effort from the worker. Many solutions have been tried. Of course as long as each family produced most of its own food, clothing, and shelter, as did primitive man or even our own pioneers, the solution was easy. The relation between effort and reward was so simple and obvious that the maximum productive effort was obtained from almost everyone. The right of any individual to own land in fee simple, so strange and wonderful to those coming from Europe, proved a powerful incentive to pioneer Americans. The meagerness of material comforts which resulted was due primarily to lack of power and tools. Our nearness to those pioneer days and their traditions is to my mind one of the greatest sources of strength of our democracy, and we must never lose sight of the fact that the nearer we can approach that close relationship between effort and reward the better will be our results. Basically, the best incentive is the one most fairly proportioned and directly related to effort and ability.

As more and more division of labor became necessary in order to increase the total productivity of man's efforts, complications entered which have never been entirely solved. Slave labor was one approach, but it went against the deepest sensibilities of the human race and proved to be an inefficient method of getting work done.

The fear of punishment has never been even a halfway substitute for the hope of reward, and by the time the overlord or the plantation owner of that time fed his slaves, paid his overseers, and then paid others to oversee the overseers, the poor quality and quantity of work obtained was not particularly cheap.

The communistic idea in its gentler and more idealistic early forms has been written about for centuries and over a hundred years ago began to appeal to numerous groups in this country. A considerable number of co-operative communities were set up in an effort to get away from the inequalities and frictions which were incident to the division of labor. If this basic idea was ever to succeed, it should have succeeded among some of those groups whose education and ideals were high, and whose wants and needs were simple. In a matter of months or years, however, it always became apparent that the inherently lazy and inefficient were taking too much advantage of their free ride, while those with vigor and ambition were not long content to support the slackers, but either decided to take things easy themselves or drifted away to some place where they felt their ability and energy would receive a more just reward.



*Republic Steel Corporation*

*Human nature, enthusiasm — primary elements in the young graduate's problem*

Such a process of reverse selection, plus the lack of appeal to the more ambitious younger generation, always brought about the failure of enterprises of these kinds. The present communistic state of Russia is, of course, not truly communistic. It is a dictatorship whose ruling class tries to maintain its power by use of the communistic lingo. Even Russia has found it necessary, in order to make even limited industrial progress, to give special rewards and recognition to the workers of outstanding ability and accomplishment and to allow most of them to own some private property. In many of the farming and some of the industrial regions the drift has been more in the direction of slave labor, with fear of punishment as the main incentive and an all-pervading secret-police system enforcing edicts. No unbiased student of Russia can claim that her few successes can be attributed to true communism, or that the present system is preferable to much of anything except the czarist terrorism which gave birth to the Russian Revolution. Not the true facts of Russia but only the vivid imaginations of some of its paid proponents or parlor-pink followers in this country can have any possible appeal to any substantial group in a nation such as ours.

Another form of highly centralized government is today having a chance to demonstrate whether it is as efficient in the long run as our democratic system. That is the fascist type of organization, where the individual is entirely subordinate to the state, and democracy and free enterprise are despised. Such an organization does have advantages in long-term planning and speedy execution of aggressive action, which no democracy would ever be able to agree upon. As long as the totalitarians can arouse their followers to almost fanatical enthusiasm for their new order as a means of redressing real or imaginary grievances and can maintain a stern secret-police administration to stamp out all evidence of disagreement, such a system will doubtless produce results.

The dictator who is a willing aggressor has a great advantage in modern warfare, also, in being able to make detailed and secret plans for concentrated attacks on a series of secret objectives, while the divided democracies which would oppose those attacks cannot plan effectively to meet them at an unknown time and in an unexpected place, and can keep little, if anything, secret. The Battle of France well illustrated this advantage of a dictatorship and also showed that a nation which is united in believing in something, even if that something is wrong, is far more effective than a nation which is divided and believes in nothing — not even in its own leaders.

A few years, however, cannot tell the story of the success or failure of any new organization of society. Already, in adversity, free democracies appear to become stronger and freemen to fight more zealously, whereas under a dictator adversity gradually leads to disillusionment. Blind obedience to a supposedly all-wise leader does not make the best fighters, especially in the air or under other circumstances when individual enterprise is at a premium. The outstanding achievements of the Royal Air Force against heavy odds during the past year have gone far to justify the confidence and respect which democracy places in the individual.

Using the criterion of the freedom and the material welfare of the common man, there can be no question that our own nation now leads the world by a wide margin. Its 160 years of rapid progress and stable government are a tribute both to the plans of the founding fathers and the honesty and ability of most of their successors. I am sure, however, that I need make no defense of our democratic form of government. The question to which I would address myself is whether the form of organization of business sometimes referred to as our capitalistic system is fundamentally sound and adapted to the modern world.

I think one of the worst things about this form of organization is its customary name, which, together with the usual cartoon of what is supposed to be a capitalist, starts the system off with a heavy handicap in any popular debate. To give it that name is not fair, because "capitalistic" falsely implies that a return on capital is the main purpose or result of the system. "Profit" system is another misnomer applied by enemies, as if profits to capital were guaranteed. I think the most accurate name for our form of organization of business is the "hope-of-profit" system, which, by skillfully holding out to capital a reasonable chance for substantial profit, can get more risks taken and more new industries built than if it guaranteed the small average rate of return which venture capital is able to make over a period of years, after losses are deducted. As far as capital is concerned, the system works a good deal like a lottery or the dangling of a carrot before a tired horse — except that if the business horse is lucky enough to get the carrot, he finds that the tax collector has already sliced off from one-third to one-half.

To my mind the ultimate success of our hope-of-profit system depends upon its ability to maintain fair and reasonable incentives — upon compensating our workers in proportion to their abilities and efforts and keeping the possibility of still greater rewards ever before them. The New Deal deserves credit for increasing the participation of the workers in the output of our industry, especially in industries where wages were particularly depressed. The New Deal must also be commended for its effective action to prevent stock manipulation and other devices which became all too popular during the hectic Twenties. These devices rewarded the speculator and manipulator, at the eventual expense of the real producers, and built up a fundamentally unsound business structure. Much of the recent social security legislation has tended to eliminate weaknesses which had become apparent in our system as industry became more and more important in our national life and as the business cycle hence became more disruptive in its impact on the whole national economy.

On the other hand, some of the tendencies of existing and proposed legislation strike at the very roots of the incentives of all classes of society. The incentive for capital to take risks has been greatly reduced by heavy taxation on both corporations and individuals. The incentive is especially reduced when taxes take the familiar pattern of "heads I win and tails you lose." The incentive for management to produce is reduced by heavy income taxes, arbitrary price limitations, and growing restrictions and (*Concluded on page 438*)



# Progress Report

## *The Accomplishments of Science in Medicine to This Point Are Varied and Important*

BY FRANK H. LAHEY

AN ALUMNI DAY CONFERENCE PAPER

USING quite simple terms and trying to cover a very large field very quickly, I should like to mention high spots in developments in medicine and surgery and their relationship to science and engineering. First I should like to say a few words about some of the accomplishments of surgery. A recent outstanding one is the total removal of the stomach. We have forty-two patients with no stomachs, their stomachs having been made for them out of segments of intestines. One patient, who has gone four-and-a-half years with a piece of intestine as a substitute for her stomach, is well, married, and since operation has been able to carry on normal activities. We used to think the appetite came from the contractions of the stomach. This patient has just as good an appetite as you and I have; she likes the smell of bacon and coffee in the morning. Therefore, we can probably assume that the appetite is cerebral in origin.

Although we all feel distressed about the situation in cancer, I am not sure that we should. We have operated on 1,200 patients with cancers of the colon or rectum; 57 per cent of the patients who had carcinoma of the rectum and 43 per cent of those with cancer of the colon are alive and well, with no evidence of recurrence five years after operation. In cancer of the larynx, engineers have played a great part. Think of the people who have their larynges removed and are able, by means of a reed instrument, to talk with the so-called artificial larynx. This is a tube inserted into an opening in the stump of the windpipe after the entire larynx is taken out. The pipe goes into the lip for articulation.

In the body are small substations, like sub power stations, which have to do with temperature in the extremities. The lumbar ganglia in back of the intestines control the nerves which cause the blood vessels to dilate. We know that a child who has had infantile paralysis often has atrophy of the muscles of one leg, so that the leg does not grow so rapidly as the opposite leg. If the ganglia are taken out on one side, the temperature in that leg is thereby elevated, the blood supply to it is increased, and its growth is enhanced. By means of this procedure as much as two inches can be added to the leg.

Now let us turn to the particular things which scientists and engineers have aided. We have been interested in thyroid diseases. Metabolism — the production of energy in the body — is controlled by thyroxine, the active principle of the thyroid gland, which stimulates prolonged energy production. The consumption of oxygen, whether it is above or below normal, is largely related to the activity of the thyroid gland. The test for

oxygen consumption is emotionally controlled, and so we have sought for a good many years a test which would not be made abnormal by emotions. Dr. M. A. B. Brazier of England produced one called the impedance angle test, with the idea that saturation of the tissues with thyroxine changed the permeability of tissue, which could be read in terms of the impedance angle, or power factor. Thanks to J. Warren-Horton [14] of M.I.T. and Professor Jamison R. Harrison of Tufts, we have been able to demonstrate that this is not a dependable measurement of thyroid activity. It is of course just as valuable to know that things are not of dependable value as to know that they are.

Next let us consider the matter of hyperthermia. Hyperthermia was made possible by some of the researches of Willis R. Whitney [90] at the General Electric Company. It was furthered by Charles F. Kettering in developing the use of air conditioning, and also by many others. By this method, temperatures can be elevated to 105 degrees and 106 degrees. A Viennese physician discovered that by producing malaria, with its high temperature, he could destroy the organisms causing syphilis. The spirillum of syphilis is hypersensitive to high temperatures, so that, by means of hyperthermia in general paresis, syphilis germs in the brain can be affected. Gonorrhea, a disease which not only involves the genital organs but also produces stiffness in the knee joint, can be affected by these high temperatures. When subjected to high temperatures, cancer cells become extremely sensitive. Therefore, the suggestion has been made that they be subjected to hyperthermia and, while they are sensitized by hyperthermia and hence are less radioresistant, be irradiated with x-rays.

Another matter of interest, discovered by Professor William H. Howell of Johns Hopkins and made practical by Dr. Charles H. Best of Toronto, is heparin. Certain diseases produce too much clotting of the blood, causing the clots that go to the brain or the lungs and bringing about fatalities. Dr. Best, who on insulin worked with Dr. John J. R. Macleod and Dr. Frederick G. Banting, has recovered heparin from the lungs of cattle and refined it. Now blood can be so heparinized that it will not clot for eight, twelve, or twenty-four hours, an achievement of great value for those patients who, after operation, occasionally discharge clots into the blood stream. When we want to sew blood vessels together, blood clots sometimes catch on the suture line and obstruct the flow. If we heparinize the blood of these patients before sewing the vessels together, the blood will not clot at the line of suture.

The advances in anesthesia are interesting. People can now be put to sleep by injection of one drug and immediately awakened by another: Pentothal can be introduced intravenously, and before the patient can count to twelve he is sound asleep. If picrotoxin is introduced, it will waken him, and he can then be put back to sleep.

The hydrocarbon anesthetics are interesting. People who are being operated upon must have plenty of oxygen in the anesthetic mixture. Nitrous oxide, laughing gas, has 9 per cent oxygen in an anesthetic mixture; ethylene ( $C_2H_4$ ), the first hydrocarbon employed for anesthesia, has 15 per cent oxygen; but cyclopropane ( $C_3H_6$ ) has 85 per cent. That is a great development, particularly for those people who are quite ill and who seriously need to have oxygen. However, cyclopropane has the disadvantage of explosiveness, to control which we turned to the M.I.T.

The Institute and other similar scientific centers have been interested in the cyclotron, which has also been of assistance to the medical profession. By means of the cyclotron, iodine can be irradiated and thus the absorption of iodine by the thyroid gland can be followed. Likewise, the cyclotron has aided treatment of leukemia, which amounts to a malignant disease of the blood. Until recent years nothing really could be done for patients with this disease except irradiating certain parts of the body. It is now possible to irradiate phosphorus, to introduce it into the blood stream, and thus to disseminate irradiation throughout the blood stream. To be sure, progress with this method of treatment is still in its infancy and no one can make any promises, but it at least offers a new development.

We all think of helium as something to be put into dirigibles; however, it is also used in anesthesia. Helium is metabolically inert; you and I can breathe it with no effect. As you know, the molecular speed of a gas is in inverse proportion to its molecular weight. The molecular weight of helium is 4, as compared with a molecular weight of 32 for oxygen. Thus, helium can be used to dilute oxygen. If a patient has a narrow windpipe from a goiter pressing upon it, he can with difficulty be supplied with an adequate amount of oxygen. Oxygen, which is a heavy gas, can be diluted with helium. If 80 per cent helium and 20 per cent oxygen are mixed, three times as much oxygen can be got through a given aperture as if pure oxygen is used, because of the fact that helium is such a light gas. Helium is also of great value in treating asthma.

Some of the outstanding developments in medicine come under the heading of chemotherapy. The sulphonyl group — sulfanilamide, sulfapyridine, sulfathiazole, and sulfanilyl guanidine — have one very desirable factor, specificity for separate germs. Sulfathiazole, for example, attacks the staphylococcus and the germ causing pneumonia. Sulfanilyl guanidine, a new drug, is specific for the colon bacillus which inhabits the intestinal tract. Fortunately, sulfanilyl guanidine is a water-soluble chemical but is absorbed slowly from the intestinal tract, so that high concentrations can be obtained in the intestinal tract. Surgical operations hence can be made safer by preliminary administration of sulfanilyl guanidine.

It is well recognized now that we must be careful in our use of these drugs. They do not kill organisms; they inhibit the growth of organisms and thus permit the natural defense mechanism of the body to destroy the organisms. We must be careful because, while these drugs are useful, they have depressing effects upon liver function and kidney function, and materially diminish blood counts. For this reason one should not speak about chemotherapy without warning everyone of the dangers in the employment of these drugs without supervision by a physician.

Everyone, of course, is interested in the vitamins. We have learned much about them. In the Lahey Clinic, where we have operated on more than 20,000 goiters, we naturally have seen many things in relation to goiter. Very often, clinical impressions foreshadow scientific discoveries. We have known that the people who have goiters have night blindness, i.e., they cannot see well in the dark. We never knew why, but we knew the condition was associated with thyroid diseases. Now we know why — vitamin A deficiency. What has that to do with night blindness? In the back of the retina is a material called visual purple, by means of which people see in darkness. When vitamin A is low, the amount of visual purple is diminished, so that a person cannot see well in the dark. The amount of vitamin A can actually be determined by photometric measurement of visual purple.

One of the most fascinating of all the vitamin developments is vitamin K, which is found in alfalfa, in greens, and, of all places, in rotten fish meal. We have known for a long time that the cause of jaundice is bile backing up in the blood stream. Patients who are deeply jaundiced bleed when they are operated on; they have lost a factor which produces clotting. Now we know that the factor is vitamin K. When it is given with bile, in which it is soluble, it has the ability to be taken up by the liver, where it is synthesized into the material called prothrombin, the factor which is lacking in jaundice and the presence of which restores the ability of the blood to clot. The great difficulty with vitamin K is that if patients are going to bleed, they cannot be given bile and vitamin K, for they cannot absorb it quickly enough. It has now been synthesized and has the name 2-methyl-1,4-naphthoquinone. This material can be given intravenously, and in three hours blood which would not clot can be made to clot.

The active principle of glands is of importance. One of the most interesting is the active principle of the adrenal gland, located over the top of each kidney. The two adrenal glands control blood pressure. We know that they occasionally are attacked by tuberculosis and that if they are destroyed, a fatality results from a condition called Addison's disease. Previously nothing could be done for patients in this condition. Now, Professor Wilbur W. Swingle and others at Princeton have demonstrated that they can produce the active principle of the adrenal gland, which is called desoxycorticosterone. This material can be sterilized, put into a tube, and pounded into a hard pellet which, if introduced under the skin, will be absorbed slowly. I have introduced several of them myself. A little slit is made under the (Concluded on page 457)

# Arming the Physician

## *Vast Applications in Medicine Are Found for Devices Which Physicists Have Developed*

BY GEORGE R. HARRISON

AN ALUMNI DAY CONFERENCE PAPER

**A**LL men are made of atoms. However, since more than atoms are needed to make a man, we do not entrust the entire care of our health to physicists. The atoms in our bodies are arranged in cells; so we need biologists. And the cells are grouped together into tissues and organs; so we need physicians. It is, nevertheless, no mere accident that the words "physicist" and "physician" differ in only two letters out of nine.

The modern physician is well armed with mental tools by the psychologist, with liquid tools by the chemist, and with solid tools by the physicist. Mental and liquid tools serve primarily for cure. For diagnosis the physician has always relied heavily on the physicist's devices. Who makes more temperature measurements in the course of a day, or more determinations of hydrostatic (or is it haemostatic?) pressure, than does the family doctor?

In recent years — one might almost say in recent months — many of the new devices which the physicist has developed have found vast application in the field of medicine. For this result the physicist deserves little credit, perhaps, inasmuch as he usually has made his contribution not deliberately but on the run while in the pursuit of his all-absorbing problem, the ultimate structure of matter. To his most exciting contributions to medicine — the microscope, of which 50,000 are in use in this country; and the x-ray machine, of which 25,000 are in use — the physicist has now added many more. I shall confine my discussion to three typical advances: the electron microscope, the spectrograph, and devices for the production of subatomic rays.

The sharpest-visioned medical man cannot, with his unaided eye, see any detail on bug or bacterium which is less than  $1/125$  of an inch long. In other words, the limit of resolution of the eye is about .008 inch; two points closer together than this look as one. The fault lies in the eye itself. Through selective breeding we might be able to grow a race of men with saucerlike eyes containing duplex lenses, but for immediate purposes we had better call in the physicist. He responded first with the magnifying glass. By use of this simple lens to magnify an object, say, five diameters, the two previously closest separable points become  $1/25$  of an inch apart and are much more comfortably scrutinized.

Next came the compound microscope, essentially two lenses placed one behind the other, giving an over-all magnification of two thousand diameters and thus enabling the physician to separate visually two points as close together as a few millionths of an inch. With the compound microscope at its highest degree of development, hundreds of varieties of bacteria became visible.

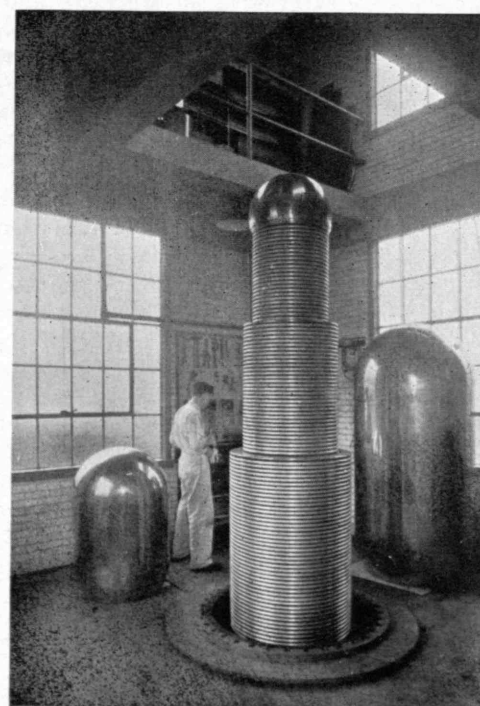
Was the physician satisfied? By no means, for even then numerous viruses were too small to be seen, and many interesting creatures were merely tiny blobs on which no detail whatever was visible. This circumstance led to a long and difficult period of attempted improvement in the microscope, during which progress was slow and slight. Physicists knew why. The trouble was not so much in the microscope as in the light waves which traversed it. The waves were too long.

The light waves which are used in microscopes are themselves about sixteen-millionths of an inch long; therefore it is hopeless to attempt to separate with them two points which are closer than about four-millionths of an inch. With visible light waves, then, the limit of effective magnification is about two thousand diameters; any greater factor must be thought of as being for convenience rather than as giving further essential information.

But the physicist has discovered many other kinds of waves. Ultraviolet light has long been known, and its waves range all the way down to the x-rays, which are about  $1/4,000$  as long as waves of light. An x-ray microscope is out at the start, however, for no one has yet learned how to bend an x-ray so as to focus it into an image. X-rays can be scattered by atoms and piled up so that they give useful information, but this is not the equivalent of direct vision.

Until we reach waves about half as long as those of green light, we do not find them at all easy to handle. For such waves it has been possible to develop a special

*These pictures show successive stages in the assembly of the latest in the group of machines built at Technology to utilize for medical and industrial purposes the technique of constant-potential generation put to work by Robert J. Van de Graaff, Associate Professor of Physics at the Institute. In this machine three generators, unaware of each other electrically speaking, are placed one inside the other and collaborate to produce x-radiation with energies over three million volts.*





ultraviolet microscope which gives useful magnifications up to four thousand diameters, separating points that are two-millionths of an inch apart. This advance, bought at the expense of long years of hard labor, is still an advance by a factor of only two.

Now comes the electron microscope with its useful magnifications up to fifty thousand diameters and its ability to resolve two points  $1/10,000,000$  of an inch apart — a gain of fortyfold over the visual microscope! This gain came as a side issue to the development of the quantum theory and the wave mechanics. The first compound microscope designed to operate with electrons instead of with light waves was built in 1932 by M. Knoll and E. Ruska, and during the intervening years the instrument has been improved by various investigators until now, in the hands of V. K. Zworykin and his collaborators at the RCA Manufacturing Company, it has reached a remarkable stage of simplicity, compactness, and ease of use. Yet to suppose that the ultimate form of the electron microscope has been attained or even envisaged would be very shortsighted.

The lengths of electron waves are given by the formula  $\lambda = \sqrt{\frac{150}{V}}$ , where  $V$  is the voltage through which the electrons have fallen and  $\lambda$  is the length of the waves in units called angstroms, which are about four-billionths of an inch. Thus an electron which has fallen through 60,000 volts in a vacuum tube (an entirely moderate value) will have waves  $1/100,000$  as long as the average light wave and hence might conceivably be used to give one hundred thousand times as much useful magnification. If shorter electron waves are required, one need merely raise the voltage on the vacuum tube in which the electrons are being accelerated. Hence the limitation in useful magnification is now set not by the waves but by the instrument.

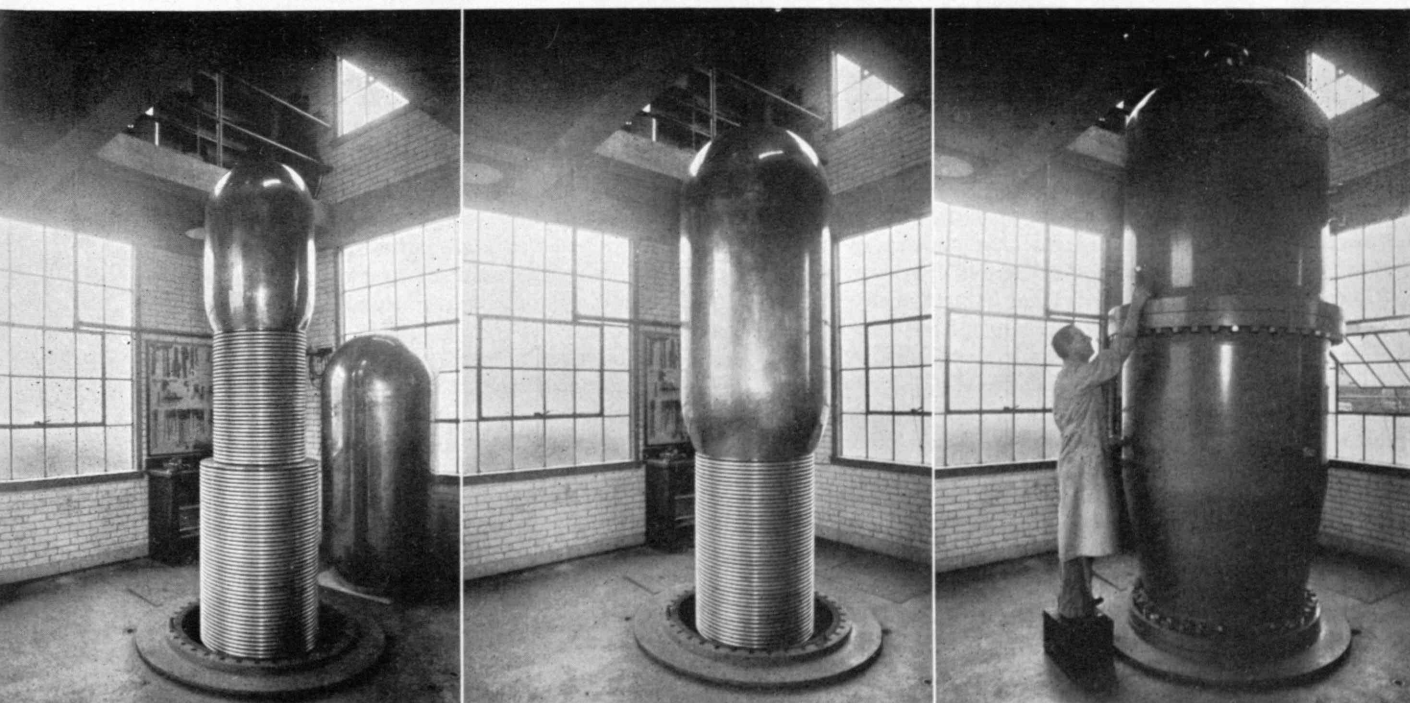
In some ways an electron microscope is simpler than an ordinary microscope; yet in other ways it is far more complicated. Instead of a source of light, a source of electrons is used — a hot tungsten wire coated with salts out of which electrons are sweated in clouds into a vacuum. In the vacuum the electrons fall prey to

strong electrical forces which hurl them at ever increasing speed in a concentrated beam against the object being examined. In passing through some spots in this object (spots which would appear dark in an ordinary photograph), the electrons are scattered more than they are in passing through other spots and so are lost from the beam. After the electrons traverse the object, they are focused into an enlarged image by coils or electrical plates corresponding to the two lenses in an ordinary microscope. This image is formed on a fluorescent screen, with the result that bright light is emitted wherever many electrons strike, while regions from which the electrons have been scattered appear dark. Thus the electron image is changed into an optical image. Alternatively, a photographic film can replace the fluorescent screen; since electrons register on a film quite as well as light waves do, and in the same manner, the usual type of picture will be obtained.

Electrons, as contrasted with light waves, have difficulty in penetrating air, and so the entire microscope — the most compact models are seven feet high — must be kept pumped to a high degree of vacuum. That this feat can now be accomplished with a minimum of inconvenience, and so rapidly that only sixty seconds are required to load the camera and take a new picture, is a tribute to the engineering skill of the RCA designers.

An outstanding problem in the new microscope arises from the fact that since electrons will not go through glass, ordinary microscope slides cannot be used. To find material transparent to electrons is much more difficult than to find material transparent to light. At present, objects being examined with an electron microscope are suspended on a wire mesh or are placed in water on an extremely thin film of cellulose material through which the electrons can penetrate. Living material can be kept enclosed in a thin vacuum-tight cage of cellulose material which is transparent to electrons.

With the present electron microscope, points as close together as  $1/10,000,000$  of an inch can be separated and made visible. The instrument as now designed has a theoretical limitation which should enable it to separate points  $4/100,000,000$  of an inch (*Continued on page 444*)



# Union for Understanding

## *As the Interrelations of Biology and Physics Are Made Clearer, Means Develop for a Better Social Order*

BY DETLEV W. BRONK

AN ALUMNI DAY CONFERENCE PAPER

IT is gratifying to one who has devoted much of his life to the development of closer relations between the physical and the biological sciences to be present on an occasion which recognizes the importance of the integration of these fields of knowledge. This is a timely period for such an undertaking. The joined efforts of the physicist and the biologist should make possible unique contributions to the solution of important problems for human welfare which crowd in upon us during these days of social readjustment. The relationship is mutually beneficial: The broader human objectives of physics and engineering will be more fully achieved if scientists in those fields are in close touch with the progress of biology. Future progress in biology depends, in turn, on the biologist's wider use of physical tools and principles.

The expanding frontiers of modern science and the multiplication of experimental methods so evident throughout the laboratories of the M.I.T. have required and encouraged severe specialization. Such specialization has been justified by its accomplishments, for without it a worker would be hampered by superficial and inadequate understanding of the problems he is investigating. A synthesis of the sciences, however, is necessary if they are to retain their broader cultural values, for only thus can the detailed facts be seen in their true perspective as parts of a more complete pattern of knowledge. The time has come when the development of science requires individuals and institutions devoted to the correlation of its subdivisions. It is therefore of unique importance that this great center of teaching and research should devote itself to the integration of the physical and medical sciences. Having been at one time or another an engineer, a physicist, a zoologist, and a physiologist, I sense the significance of Technology's undertaking.

The biologist and physician are primarily concerned with two fundamental problems: the nature of the structure of living systems and the modifications which are induced in that structure by changes in the environment. These are the classical problems of form and behavior. Except in so far as they are superficially descriptive, they are merely special domains of physics and chemistry. Their advance has waited in the past upon the development of new tools and new points of view in the physical sciences. The future opportunities of the physical sciences in medicine will necessarily depend upon the future course which is taken by medicine itself.

What that course may be is a hazardous guess. Judging by present trends, I see three lines of development significant to the present discussion. First is the increased necessity for describing the structure and activity of living organisms in terms of fundamental physicochemical processes. This is no new development, but it is being hastened by the disappearing frontiers of classical descriptive medicine and biology and by the stimulus of extraordinary progress in the physical sciences.

Second is the increasing awareness of the sensitive reaction of a living organism to its environment. As our knowledge of the fundamental nature of vital processes is extended, this awareness grows. It is made more acute by the swift extension of physics and the consequently accelerated change of industrial and cultural life. The medical sciences are therefore being led to a keener concern regarding the influence of environmental conditions on the health and habits of man. The growing interests in public health, industrial hygiene, and psychiatry are indications of this second important trend.

Finally, I believe that the dramatic swiftness of the changes in modern life will awaken the physician to the important role he can play in shaping the new order. Civilizations are built by man for man, and a knowledge of the requirements and limitations of human life is essential to the effective direction of social and industrial evolution.

The biologist and physician can make their contributions to the broader reaches of human life only through their understanding of the basic phenomena of living organisms. The analysis of these phenomena will depend, in an increasing degree, upon the use of physical concepts and methods because the living cell, of which all organisms are composed, is an aggregate of molecules and ions subject to no laws unique to living matter. Only in the formidable complexity of their organized structure do cells and assemblages of cells present special problems. Even these problems of structure depend for their ultimate solution upon physicochemical analyses.

As Karl Darrow in *The Renaissance of Physics* says: "When a biologist wants to know the structure of an organism, he proceeds to dissect it. When a physicist wants to know the structure of those simplest of all organisms which we call 'atoms,' he too must dissect it. I do not wish, of course, to suggest that he can take his knife and hack the atom to pieces. . . . No: when I speak of dissecting atoms or dissecting matter, I refer

to the fact that we can draw negative electricity out of every substance which there is. When we pull or drive electrons out of a piece of matter, we are taking matter apart — and taking a thing apart is the traditional way of finding out how it is put together.”

Actually, the biologist and physician are beginning to use methods for “dissection” similar to those employed by the physicist. For they now recognize that no matter how delicate may be their knife or how extraordinary their skill, they cannot hope to extend very far their knowledge of the structure of living things by hacking them to pieces. Nor does the microscope give all the information desired. Hence the biologist and the physician look hopefully toward the new tools of analysis developed by the physicist.

It is difficult to overemphasize the importance to biology and medicine of this analysis of the finer structure of living matter, for the arrangement of molecules and ions within cells ultimately determines the characteristics of cellular action. Certain modifications of the structure constitute disease. The measurement of those variations which are hidden from the microscopist should accordingly help to reveal the causes of disease and suggest means for its cure.

The use of x-rays and polarized light has already revealed to Professor Francis O. Schmitt many facts concerning the arrangement of molecules and atoms in cells, and the electron microscope will probably be a valuable asset in his studies. Following the techniques developed by Irving Langmuir for the study of molecular films, Leslie Chambers has shown that the orientation of molecules in the surface layers of cells is an important factor determining the specificity of certain immunological and serological reactions. The brilliant work of W. M. Stanley on the crystalline structure of viruses “has provided reasons for considering that life as we know it owes its existence to a specific state of matter and that the principle of the vital phenomenon does not come into existence suddenly, but is inherent in all matter.”

One serious limitation of many methods for observing cellular organization is that they can reveal the living system only as a static structure. Actually, that system is in a continuous state of restless change throughout life. To detect those changes requires, in many instances, the utmost speed and sensitivity available in modern physical methods.

The continual redistribution and re-arrangement of the atomic and ionic components of cells is a consequence of the unique sensitivity of living cells to changes in the environment. This sensitivity is due to the fact that the organization of a cell is unstable. The existence of the complex structure of these organized systems of molecules and ions is maintained only by an adequate supply of energy and depends upon a delicate balance between opposing forces and reactions. It is accordingly not surprising to find that the structure of a cell at any instant is determined by the physical and chemical agents surrounding it. Such a modification of cellular structure by the environment is the physical basis of life.

That is to say, life is the continued sequence of changes induced in cells by previous changes in their environment. If this sensitive reaction to the environ-

ment is the result of an unstable organization of the molecules and ions of which an organism is composed, we may well ask whether variations in the surroundings will not modify the organization to such a degree that it will no longer retain the properties characteristic of a living system. In an unchanging environment this outcome is averted by a balance between the forces tending to produce disintegration and those which restore the normal structure. But as the environmental changes proceed, this delicate balance is destroyed and the system tends to disintegrate. That such dissolution is not general is due to the fact that a change in the surroundings not only induces changes in the structure of the organism but induces such changes as will limit the sequence of events leading to destruction of the living state. The only requirement for continued existence as a living system is that the previous properties of the organism shall have become so altered that the new structure can react and adapt itself to a further change of the environment. If the physical surroundings change too rapidly or too much, a new balance between the processes of dissolution and reorganization may not be established, and then disintegration of the living structure will follow.

Remarkable mechanisms have been evolved in the more complex organisms in order to maintain relative constancy of the physical and chemical conditions within the body despite wide fluctuations of the environment. In all of these regulatory mechanisms the nervous system plays a major role, for it is primarily responsible for bringing the vast assemblage of cells into an ordered pattern of activity. A brief consideration of the action of the nervous system will illustrate the dynamic nature of biological systems and emphasize the growing dependence of physiological research on the physical sciences.

We have had clear and detailed microscopic pictures of the outlines of the cells which compose the nervous system and of the differentiated portions which react differently to specific chemical dyes. Such studies, made possible by a physical instrument, have given us a vast amount of important information regarding the arrangement of nerve cells relative to one another. Chemical analyses of isolated nerves have told us of their molecular composition. The intimate nature of the structure involved in the action of nerves and the events that give them their power of control are, however, still problems on the frontiers of biology.

Professor Schmitt has led one important line of progress. By the use of x-rays and polarized light he has made careful and important determinations of the arrangement of proteins and lipoids in the cell surface and has measured the dimensions of membranes. Another attack on the nature of the surface and its changes has been made by Kenneth S. Cole, who has confirmed the theory that a nerve cell controls some remote structure or another nerve cell by the propagation of a wave of electrochemical change which involves a progressive and reversible change of the ionic permeability of the nerve surface. After long years of physical and biological research, Cole has developed methods for measuring the impedance of the surface membranes. He finds that with the spread of an impulse (*Continued on page 452*)



# Science and Engineering in Medicine

## Eleventh in a Series of M.I.T. Library Reading Lists

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THE eventful progress in physical science made during the present century has its counterpart among the sciences which have to do with the visible and invisible world of living things, leading, not only to the overturning of concepts once thought to have been enduringly established, but also to the development of entirely new divisions of biological science." — FRANK F. BUNKER in *Cooperation in Research* (see below).

### I. FOR THE GENERAL READER

CARNEGIE INSTITUTION OF WASHINGTON. *Cooperation in Research*. Washington, D. C.: Carnegie Institution of Washington, 1938. Pp. ix+782. \$5.00.

Has an entire section devoted to the biological sciences.

HARRISON, GEORGE R., staff. *Atoms in Action: the World of Creative Physics*. New York: Morrow, 1939. Pp. x+370. \$3.50.

RATCLIFF, J. D., '25. *Modern Miracle Men*. New York: Dodd, Mead, 1939. Pp. 311. \$3.00.

In breezy, journalistic style the first fourteen chapters describe recent developments in medicine.

SHRYOCK, RICHARD H. *The Development of Modern Medicine: an Interpretation of the Social and Scientific Factors Involved*. Philadelphia: University of Pennsylvania Press, 1936. Pp. xiv+442. \$4.00.

SMITH, GEDDES. *Plague on Us*. New York: Commonwealth Fund, 1941. Pp. 365. \$3.00.

SOLOMON, ARTHUR K. *Why Smash Atoms?* Cambridge: Harvard University Press, 1940. Pp. xii+174. \$2.50.

ZINSSER, HANS. *As I Remember Him: the Biography of R. S.* Boston: Little, Brown, 1940. Pp. ix+443. \$2.75.

Reflections on life, education, politics, and scientific research by a distinguished bacteriologist and stimulating teacher.

### Articles

BUNKER, JOHN W. M., staff. "Biological Engineering," *School Science and Mathematics*, 39:671-677 (October, 1939).

COMPTON, KARL T., President. "Possibilities in Biological Engineering," *Mechanical Engineering*, 60:494-495 (June, 1938). Abstract of an address to the American College of Physicians.

### II. PHYSICS AND MEDICINE

CLARK, GEORGE L. *Applied X-Rays* (3d ed.). New York: McGraw-Hill, 1940. Pp. xvii+674. \$6.00.

"Since 1932 [when the second edition of this book appeared], there has come into clearer relief a classification of applications of astounding scope — physics, electrical engineering, spectroscopy and atomic structure, chemical analysis, medical, industrial and artistic diagnosis, photochemistry, genetics, biological identification, cancer therapy, crystallography, crystal chemistry, and ultimate fine-structure analysis of the inorganic and living world. . . ." — Preface.

DUGGAR, BENJAMIN M. (editor). *Biological Effects of Radiation: Mechanism and Measurement of Radiation, Applications in Biology, Photochemical Reactions, Effects of Radiant Energy on Organisms and Organic Products*. 2 vols. New York: McGraw-Hill, 1936. \$12.00.

ELLINGER, FRIEDRICH. *The Biologic Fundamentals of Radiation Therapy: a Textbook*. English translation by Reuben Gross. New York: Nordeman (distributors), 1941. Pp. xvi+360. \$6.00.

"A comprehensive survey of the enormous mass of scattered information pertaining to the biologic fundamentals of radiation therapy." — Maurice Lenz in the preface. Bibliography of 1,100 items.

ELLIS, CARLETON, '00, and ALFRED A. WELLS. *The Chemical Action of Ultraviolet Rays* (revised and enlarged edition by F. F. Heyroth). New York: Reinhold, 1941. Pp. 961. \$12.00.

MANN, W. B. *The Cyclotron*. Brooklyn: Chemical Publishing Company, Inc., 1940. Pp. xi+92. \$1.50.

MILLER, ELMER S. *Quantitative Biological Spectroscopy*. Minneapolis: Burgess Publishing Company, 1939. Pp. 213. \$3.50.

". . . To give a brief survey of the various types of spectroscopic apparatus available, and to acquaint the student with the details of calibration necessary to give the desired accuracy." — Preface.

ROBERTSON, JOHN K. *Radiology Physics: an Introductory Course for Medical or Premedical Students and for All Radiologists*. New York: Van Nostrand, 1941. Pp. 270. \$3.50.

WEYL, CHARLES; S. REID WARREN, JR.; and DALLETT B. O'NEILL. *Radiologic Physics*. Springfield, Ill.: Charles C. Thomas, 1941. Pp. xvii+459. \$5.50.

Part I deals with the theory and practice of electrical engineering as applied to radiological apparatus; part II, with the theory and application of radiation physics with reference to x-ray diagnosis and x-ray and gamma-ray therapy.

### Articles

EVANS, ROBLEY D., staff. "Applied Nuclear Physics," *Journal of Applied Physics*, 12:260-269 (April, 1941).

The entire issue of the journal is devoted to the applications of nuclear physics and includes abstracts of the papers given at the Conference on Applied Nuclear Physics held at M.I.T. last fall.

LOOFBOUROW, JOHN R., staff. "Borderland Problems in Biology and Physics," *Review of Modern Physics*, 12:237-358 (October, 1940). Includes a bibliography of 1,203 references.

SMITH, T. A. "The Electron Microscope," *Scientific Monthly*, 52:337-341 (April, 1941).

TRUMP, JOHN G., '33, staff; ROBERT J. VAN DE GRAAFF, staff; and ROBERT W. CLOUD, '37, staff. "Compact, Supervoltage, Roentgen-Ray Generator Using a Pressure-Insulated Electrostatic High Voltage Source," *American Journal of Roentgenology and Radium Therapy*, 44:610-614 (October, 1940).

### III. CHEMISTRY AND MEDICINE

ABRAMSON, HAROLD A. *Electrokinetic Phenomena and Their Application to Biology and Medicine* (American Chemical Society Monograph No. 66). New York: Chemical Catalog Company, 1934. Pp. 331. \$7.50.

"Indispensable to every colloid chemist, and especially to those interested in surface reactions in biological and medical problems." — H. B. Weiser in *Industrial and Engineering Chemistry*, July 20, 1934.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, SECTION ON CHEMISTRY. *Recent Advances in Surface Chemistry and Chemical Physics* (edited by F. R. Moulton). Lancaster, Pa.: Published for the A.A.A.S. by the Science Press, 1939. Pp. 133. \$2.50.

AMERICAN MEDICAL ASSOCIATION. *The Vitamins*. Chicago: American Medical Association, 1939. Pp. 637. \$1.50.

These thirty-one articles, which comprise a symposium arranged under the auspices of the council on (Continued on page 456)

# THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

## Expression of Technology

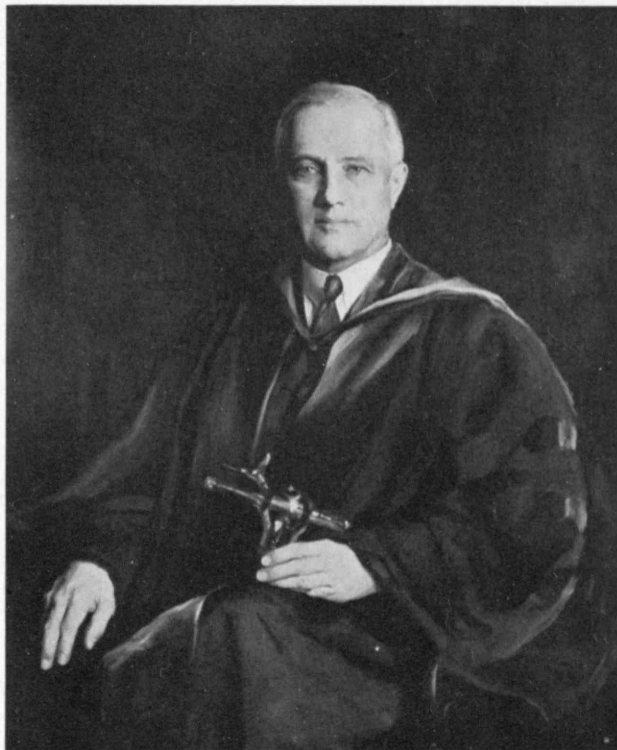
### *Alumni Day 1941 Superlative in Its Statement of All Aspects of the Life of the Institute*

TECHNOLOGY in the full strength of its three great characteristics was given superlative expression in the festivities of Alumni Day 1941. The historic tradition and friendly good-fellowship which are the heart of the school, the devotion and contribution to science and engineering which are its identifying activity, and the direct participation in national service which is its function — all were set forth in act and spirit as Institute people gathered again in the annual custom. The efforts of the committees under the general chairmanship of Richard Whiting, '26, resulted in eminent success in the operation of a crowded program; the skies were benign; the high marks set in the past were given yet another boost. Attempting here to survey the whole affair, The Review faces an embarrassment of riches, and hence presents aspects only.

### *... National Usefulness ...*

This year, of course, the Institute as a factor in the national life of the country has particular significance. High point of the traditional dinner concluding the day's events was the portion of President Compton's report to Alumni devoted to consideration of Technology's part in national defense. Dr. Compton said:

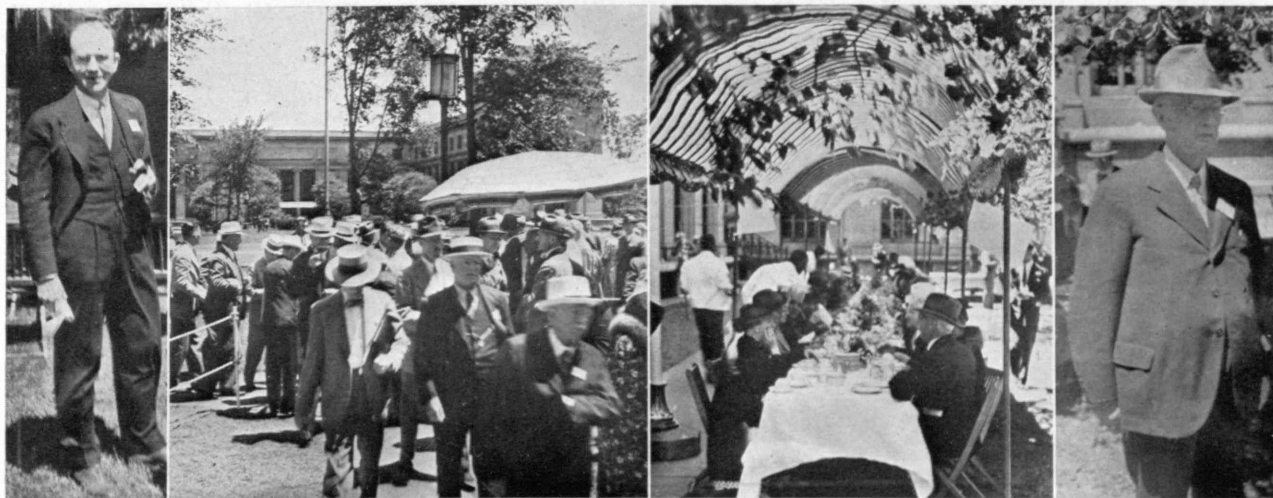
The great events in Technology history which we celebrate in this alumni festival of 1941 inevitably emphasize a striking similarity in the years 1861, 1916, and 1941 — all periods



*George H. Davis Studio*

*The portrait of President Compton unveiled on Alumni Day*

of crisis. Eighty years ago M.I.T. received its charter from the Massachusetts General Court as the country plunged into the Civil War. Twenty-five years ago, when the Institute was



*M.I.T. Photos*

*Alumni Day chairman Richard Whiting, '26, preceding scenes of the day. — On the way to luncheon. — The 50-year class table. — C. Frank Allen, '72.*

establishing itself in its "more ample home" in Cambridge, we were in another great crisis and on the verge of conflict. And now in 1941, events have come full circle again, and we meet amid the mobilization and fateful challenge of a grim national emergency.

I recall these parallels because they serve to point up our situation today. Looking backward serves to show not only how far we have come but how far we can go despite wars or rumors of wars. Looking backward also serves to surround with the proper humility our pride in the accomplishments of today. . . .

With full consciousness of our indebtedness to the past, I turn to a report on Technology in 1941. . . . The record, it seems to me, reveals a measure of public service and an adaptation to changing needs which fulfill the promises of the past and set in bold relief the vital importance of the Institute as a great national resource.

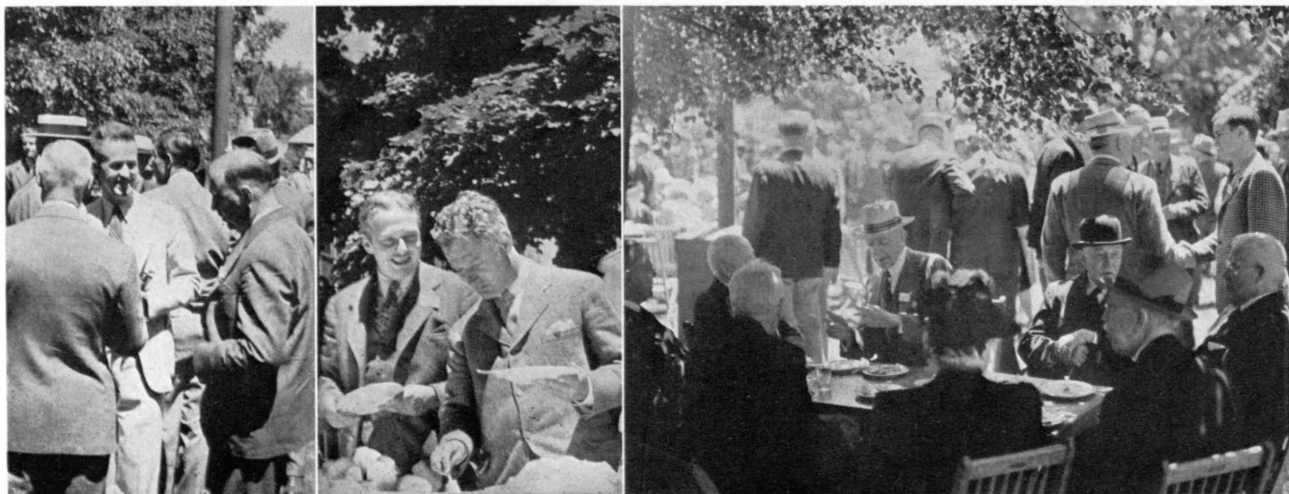
The first way in which the Institute responded to the national emergency was to provide experts from its staff to serve on various advisory or operating committees of the government. The extent of this service is indicated by the fact that nearly one hundred members of our staff are now engaged in governmental work. The range of services is shown by some typical activities: Robert G. Caldwell, our Dean of Humanities, is associated with Nelson A. Rockefeller in an important program of cultural relations with the South American republics. Edward L. Moreland, '07, our Dean of Engineering, is administrator for northern New England in the National Defense Training Program and serves on a regional committee of the Office of Production Management. Jerome C. Hunsaker, '12, Head of the Departments of Aeronautical and Mechanical Engineering, is a member of the National Advisory Committee for Aeronautics and a special adviser in many government activities. Douglass V. Brown, Associate Professor of Industrial Relations, is serving as a business specialist. And Professor Ralph D. Bennett of the Department of Electrical Engineering, and Francis Bitter, Associate Professor of the Physics of Metals, have been called to important technical service with the Navy. A large group of members of the staff, including myself, are serving on the National Defense Research Committee and its subcommittees. Incidentally, M.I.T. Alumni are well represented on this defense committee. Vannevar Bush, '16, our former Vice-President and Dean of Engineering, is chairman; Frank B. Jewett, '03, and Richard C. Tolman, '03, are members.

The second major defense activity of the Institute is the operation of intensive defense training courses. Last autumn Congress appropriated nine million dollars to finance an engineering defense training program to be conducted in qualified colleges under the auspices of the United States Office of Education. This appropriation was in addition to an earlier one of sixteen million dollars for training of mechanics and technicians in the trade schools and technical high schools of the country. The engineering college program is now in full swing, and over four hundred intensive courses are being given in nearly one hundred institutions throughout the country. Each of these courses is specially designed to train students for service with manufacturers or Federal agencies in capacities of engineers, designers, operators of technical equipment, inspectors, or supervisors of production. On last report about seventy-four thousand students were enrolled to study for these positions.

The Institute's work in this field is part of a larger local program which has been co-operatively organized, under the United States Office of Education, by the four schools offering engineering education in metropolitan Boston—M.I.T., Harvard, Tufts, and Northeastern. The M.I.T. itself has offered fifteen special courses, and by summer's end nearly one thousand students will have completed the courses.

Apart from this special defense training program, M.I.T. is offering other types of defense training to regularly registered students. For many years the United States Navy has sent to the Institute a group of young naval officers for postgraduate study, particularly in the field of naval construction. At the request of the Navy Department we have established a new program which combines separate courses in naval construction and naval engineering into a single co-ordinated program. Of the sixty officers who have been detailed here during the academic year, forty have been taking the three-year program, and the remainder have been studying in the fields of meteorology, electrical engineering, mechanical engineering, and aeronautical engineering.

Weather forecasting has become an essential feature of modern warfare, and for a number of years M.I.T. has been giving postgraduate training in weather forecasting to young men sent to us by the Army, Navy, and weather bureau. But now the national defense needs demand a very great increase in the number of men trained in this highly specialized field and in modern methods but recently developed, in which instruction is available at only about five institutions in this country.



M.I.T. Photos

1921 debates: Edmund G. Farrand of Chicago, Carole A. Clarke of New York. — John E. Burchard, '23, and Herbert L. Beckwith, '26, loading up. — William R. Thomas, '87, Godfrey L. Cabot, '81, N. P. Ames Carter, '87, Frederick A. Kendall, '87, Giles Taintor, '87, Winthrop Cole, '87, Mrs. Carter, and Frank F. Tripp, '87, in discussion.



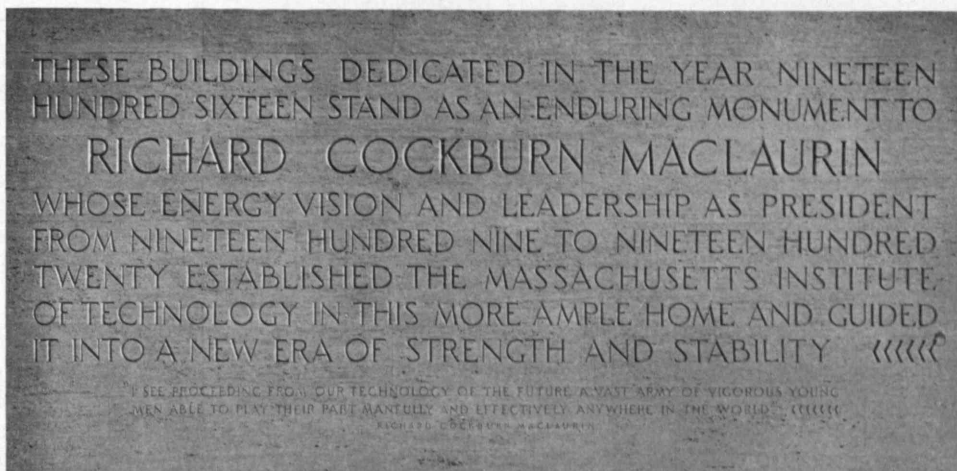
Last summer a special intensive course was given to recruits from the meteorological service and the Army Air Corps. During the year just closed we have had another group of approximately sixty special postgraduate students in this subject, training for the Army Air Corps and the weather bureau; the course is to be repeated beginning July 1 and extending through next January.

The largest of the Institute's activities in the national defense field is its research program. At the present time sixty-three separate contracts for research and development are in force. Several of the contracts include more than one project, so that the number of individual researches under way is over seventy. Of the sixty-three contracts at present on the books, thirty-six are with government agencies and the remaining twenty-seven with industrial firms.

The magnitude of our research program is indicated by the direct and indirect expenditures for this purpose, which are exceeding two million dollars during the year, and by the size of the staff engaged in it, which may reach three hundred this summer. This corps of expert investigators has been recruited from institutions throughout the country, and most of the men have been generously given leaves of absence from their institutions.

The total expenditures involved in defense research at Technology are approximately two-thirds of the Institute's normal annual operating budget, and the personnel needed has required an increase in our staff of approximately 50 per cent.

To house this program has demanded extensive re-adjustments in our space assignments and the most intensive use possible of our buildings. Last March we completed a small storage building to take care of the needs of our Department of Military Science and Tactics and to relieve congestion in the main buildings. Hardly was it finished when we found that we had to devote a portion of it to special national defense



M.I.T. Photo

*The memorial inscription to President Maclaurin presented by the Class of 1916*

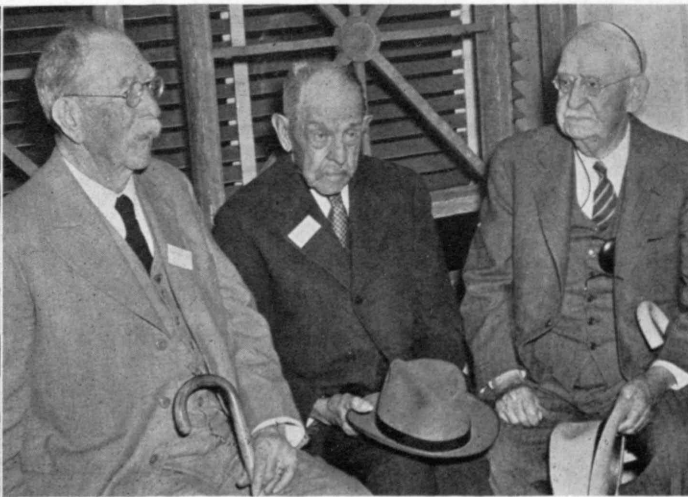
research. Defense needs also prompted the Corporation to authorize the construction of a new building for chemical engineering. In response to defense needs we have allotted or begun construction on 86,000 square feet of space, an area roughly equivalent to the space in the William Barton Rogers Building.

Naturally nothing can be said in regard to the subjects or the objectives of this defense research, and exceptional precautions and safeguards have been put into effect to preserve the confidential character of the work and to insure the loyalty and discretion of those engaged in it. I should not feel justified in giving even this over-all statistical picture were it not for the fact that it can be no secret that M.I.T., along with a hundred other educational institutions and a great number of industrial organizations, is actively working on the technological aspects of this great national defense effort. The alert layman need but reflect upon some of the acute technical problems which have been presented by the war abroad to guess the directions of some of the research and to realize its urgent importance.

I feel justified, too, in pointing to what is being done as a striking example of the national usefulness of an institution such as ours. The extent to which Technology has been called upon is an index, I think it is fair to say, of our superb resources



M.I.T. Photo



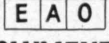



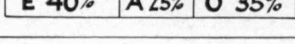


Courtesy Boston Globe



M.I.T. Photo

*B. Edwin Hutchinson, '09, President-elect of the Alumni Association, and Mrs. Hutchinson chat with Charles T. Main, '76. — Three from 1873: George M. Tompson of Wakefield, Henry P. Cogswell of Wenham, and William T. Leman of St. Petersburg, Fla. — William F. Rivers, '26, back from Calcutta for an interlude, talks things over with classmate James R. Killian, Jr.*

	
<b>EDUCATIONAL PLANT CAPITAL</b>	
1916 	\$ 7,200,000
1941  E A O	16,000,000
<b>ENDOWMENT AND OTHER FUNDS</b>	
1916 	4,800,000
1941  E A O	36,000,000
<b>TOTAL - PLANT AND FUNDS</b>	
1916 	12,000,000
1941  E 40% A 25% O 35%	52,000,000

*E A O equal Eastman, Alumni, Other in this representative sample of the graphic material vitalized by Treasurer Horace S. Ford at the Alumni Day dinner.*

of staff and facilities, of the fundamental importance of our program, and of the recognized availability of these assets for national service. Since it was founded, the Institute has had no reason to change its basic objectives, whether in times of prosperity or of depression, of peace or of war. Its contribution in this defense emergency is simply a dramatic demonstration of its vitality and accomplishment in peacetime and of the growing value of science and technology as the foundations of national strength and the mainsprings of future progress.

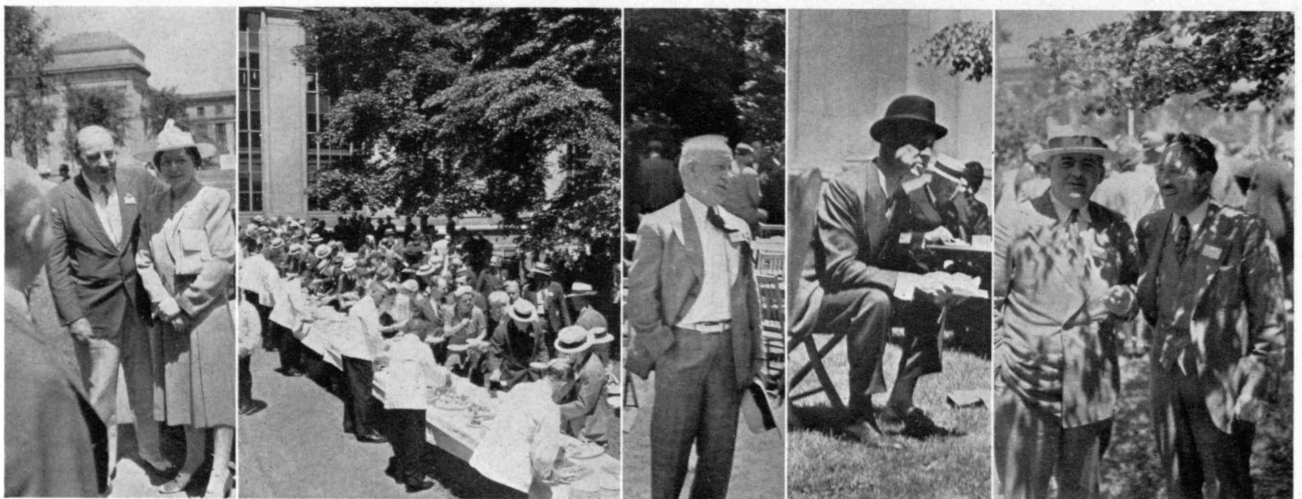
The national usefulness of the Institute requires further that normal educational work continue with as little disturbance as possible. That it is so doing was emphasized by Dr. Compton's summary of the ways in which the Institute's full program is being maintained. Important gains toward this end include the new laboratory, which will remove restrictions from the full potentialities of the Department of Chemical Engineering; the dental clinic, which will augment the effectiveness of the Medical Department; and the authorization of the new degree of doctor of philosophy in industrial economics.

### ... Means to an End ...

Dr. Compton's opening allusion to the past may well focus consideration on the impressive part of the Alumni Day program which was concerned with Technology tradition — of special import on this twenty-fifth anniversary of the Institute's establishment in its present home. Unveiling and dedication of an inscription honoring Richard Cockburn Maclaurin, seventh President of the Institute, were the central event of this portion of the day's festivities. Cut in the east wall of the Main Lobby, the inscription was presented to the Institute by the twenty-five year Class of 1916 as its reunion gift. The ceremonies attending the dedication were simple and impressive. Presiding was Edwin S. Webster, '88, of the Corporation, who was president of the Alumni Association in 1909 when Dr. Maclaurin was elected Institute president. In opening the exercises, Mr. Webster emphasized Dr. Maclaurin's "fundamental preoccupation with advancing the Institute into new regions of science and engineering, improving its efficiency in teaching, and broadening its service to the country."

Jerome C. Hunsaker, '12, introduced as having pioneered, with Dr. Maclaurin's support, in the first instruction in aeronautical engineering at an American educational institution, stressed Dr. Maclaurin's wide knowledge of educational systems, saying in part:

Richard Maclaurin accepted the leadership of the Institute only after a searching examination of its educational methods and objectives. To this examination he brought extraordinary scientific competence, a knowledge of the educational systems of three continents, and an understanding of human values as evolved in the basic structure of the law. Maclaurin found in William Barton Rogers' concept of the concurrent pursuit of general education and professional training an opportunity to practice a doctrine he once quoted from Carlyle: "The end of man is an action and not a thought, though it were the noblest." He also found that the problem of carrying out a scheme of learning by doing had become enormously complicated since Rogers' day by the vast increase of scientific knowledge and its manifold engineering applications. In fact, Maclaurin found the problem had grown quite beyond Technology's facilities and finances. . . .



M.I.T. Photos

Robert E. Wilson, '16, commencement speaker, with Mrs. Wilson. — The alfresco buffet. — Charles E. Smith, '00. — Welles Bosworth, '39. — Alfred T. Glassett, '20, informs classmate John D. Mitsch of New York affairs.



Nevertheless Maclaurin accepted leadership. He really accepted a challenge to create a new Technology, to make a truly scientific university worthy of America. He accepted this challenge with faith in an educational ideal, faith in a vigorous faculty and alumni body hungry for leadership, and faith in the future of the America with which he had cast his lot.

In June, just twenty-five years ago, we dedicated the physical plant of the new Technology, created from Maclaurin's bold and courageous trust in the shape of things to come. Unseen at first to others, this shape of things to come must somehow have been apparent to him, and through him to those who gladly accepted and followed his leadership.

William J. Farthing, President of the Class of 1916, then made the formal presentation of the inscription to the Institute. Sketching the history of Dr. Maclaurin's coming to Technology, of his recognition of the problems posed by the physical limitations of its plant at the time, and of his vigorous attack upon them, Mr. Farthing recalled the participation of his Class in the dedication of the Institute's buildings in 1916. He declared:

That thrilling June day in 1916 found Dr. Maclaurin looking ever forward. He felt that his task had only just begun. He had provided the shell for a great institution — now he must breathe into it the life of scholarship, of accomplishment in the real things that such an institution must stand for. Dr. Maclaurin saw in research the great force that would make man master of his universe — he envisioned technical training as the great instrumentality for putting the research worker's findings at the command of society. And undoubtedly his great success in securing financial assistance rested upon the force and sincerity of these convictions. He made those who were able to help, see how they could through his offices render to their fellow man services that they could never provide through their own efforts.

The inscription was then unveiled by W. Rupert Maclaurin, Dr. Maclaurin's son, who, as associate professor, heads the Industrial Relations Section of the Department of Economics and Social Science.

In accepting the inscription in behalf of the Institute, President Compton paid tribute to Dr. Maclaurin's

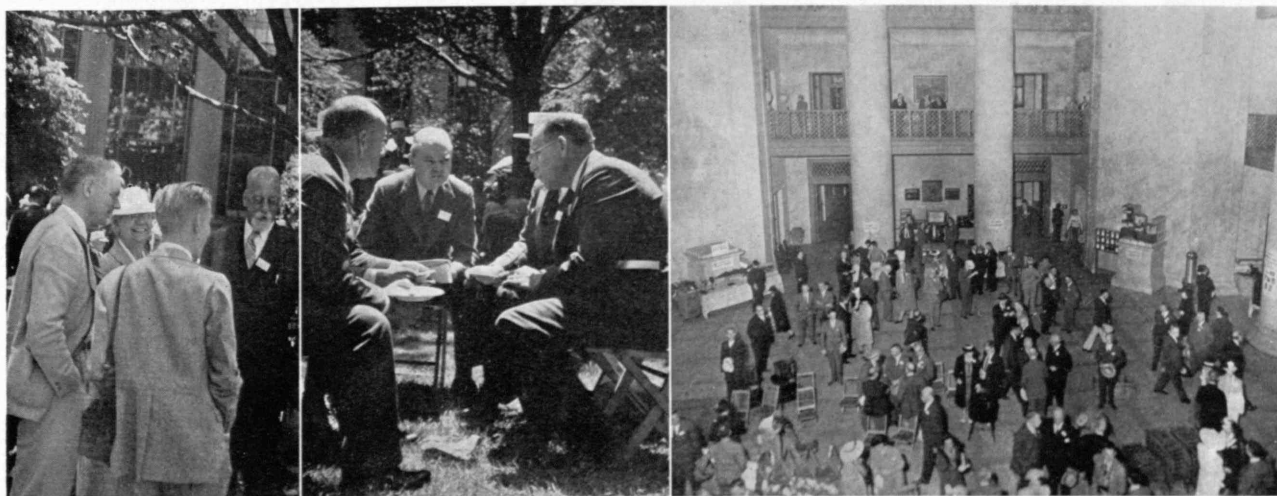
	1916	1941
MASSACHUSETTS	1,060	951
UNITED STATES (EXC. MASS.)	715	1,963
FOREIGN	125	224
	1,900	3,138

*Depiction of another significant change in M.I.T. affairs during the past quarter century, as presented by Treasurer Horace S. Ford at the Alumni Day dinner*

work for Technology, saying, "Today we are still striving to follow the course he set." President Compton cited several of Dr. Maclaurin's statements of the purposes of education, which he described as standing as beacon lights at the Institute. He offered the affection and admiration of Technology to Mrs. Maclaurin, who, with her sons, William Rupert and Richard Colin, attended the ceremony.

Record of other phases of Technology tradition was made on Alumni Day through the presentation of three portraits — those of George F. Swain, '77, long associated with the Department of Civil Engineering and its Head from 1888 to 1909; Everett Morss, '85, member of the Corporation for many years and Treasurer of the Institute from 1921 to 1933; and President Compton.

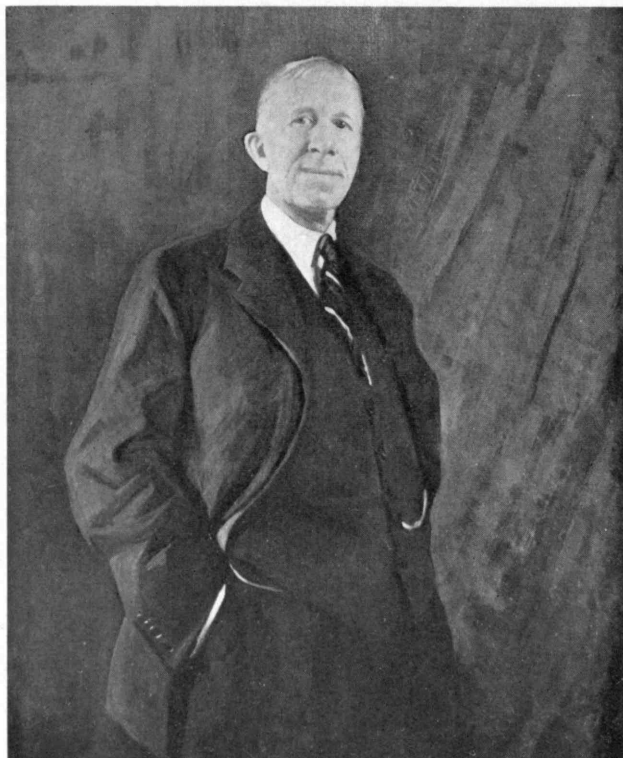
Mr. Whiting, as chairman of Alumni Day, presided at the dedicatory meeting at which the portraits were presented. Charles B. Breed, '97, Head of the Department of Civil and Sanitary Engineering, speaking of Professor Swain, sketched his career as engineer and



M.I.T. Photos

*The Joseph Harringtons, '30 and '96, after luncheon. — 1914 in council: Harold S. Wilkins, Frank J. Jerome, Ernest C. Crocker. — Rogers Lobby, where exhibits entered.*





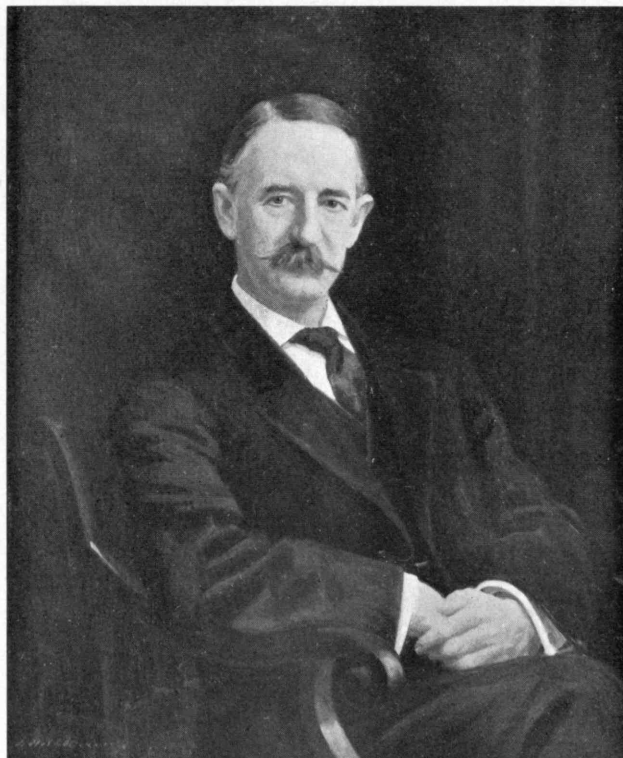
M.I.T. Photo

*The Everett Morss portrait presented on Alumni Day*

educator. Harry J. Carlson, '92, of the Corporation, described Mr. Morss's many services to Technology. Gerard Swope, '95, also a member of the Corporation, spoke in appreciation of the ways in which Technology tradition has been fostered and expanded during the years of Dr. Compton's administration. Mrs. Compton and Miss Jean Compton unveiled the portrait of Dr. Compton, which is the work of Sally de Camp Moffat and was presented to the Institute by Mr. Swope. The portrait of Professor Swain was done by J. Olaf Olson and is the gift of Professor Swain's former students. That of Mr. Morss, which was painted by Gertrude Fiske, came to Technology through the generosity of an anonymous donor.

### *. . . Tech Marches On . . .*

In the quarter century marked by the unveiling of the inscription to Dr. MacLaurin, many changes, naturally, have occurred in Technology affairs. In curricula, staff, equipment, student body, student life — that is, in the outward expressions of the inward being of the school — the Institute of 1941 shows differences and changes from 1916. Reviewing these at the dinner concluding Alumni Day was Horace Ford, Treasurer, whose intimate knowledge of Technology is probably exceeded only by his devoted service to its best interests throughout his long association with it. Changes in educational institutions, like changes in almost everything, are in the main measured statistically, and so Mr. Ford was faced with the task of telling a statistical story to seven or eight hundred banqueters after a crowded and enthusiastic day. He was more than equal to the assignment. Chart after chart went on the screen, showing graph-



M.I.T. Photo

*The portrait of George F. Swain, '77, presented on Alumni Day*

ically, and with plenty of color, increases in buildings and equipment, increases in funds, changes in make-up of the student body, improvements in student housing, growth of Departments, development of a constantly enhanced recreational program, and increase in numbers and scholarly attainment by the Faculty. Particular emphasis was placed upon the augmented human resources of Technology in staff, students, and Alumni. Charts by themselves, however, mean little. The Treasurer's genial running fire of comment, explanation, description, as it changed pace with his subject matter, made the survey alive and sapient. Throughout, his emphasis was not on mere increase and change as such, but on the fact that in them is to be found the meaning of the past twenty-five years. They have come to be because of the continuing tradition of Technology spirit expressed in the urge to competitive excellence; in the wholehearted co-operation of Corporation, Faculty, Alumni, and friends; in the desire to be of greatest use in time of national emergency; and in the great leadership of such Presidents as Dr. MacLaurin in 1916 and Dr. Compton in 1941.

Implicit in Mr. Ford's story was the quality of good-fellowship which marked the day and about which much could be said. The weatherman actively participated in it. It was conspicuous in the reminiscent gatherings at the luncheon in Du Pont Court, and was undernote throughout the address of the fifty-year-class speaker, Henry A. Fiske, '91, at the Class Day exercises which followed. Thomas D'Arcy Brophy, '16, spoke for the twenty-five-year class. The customary exercises were witnessed by a large number of spectators and were well received. The concluding dinner, satisfy-

ing in its bill of fare, was marked by a unity of spirit notable in Technology events — a unity well expressed in the singing of "Mens et Manus," written by Gordon M. Fair, '16, the last two verses of which were prepared in anticipation of the twenty-fifth reunion of the Class of 1916 and which were dedicated to the memory of Henry Greenleaf Pearson, who served for many years as head of the Institute's Department of English and History.

### ... Allies ...

The Alumni Day conference this year had as its subject, "Science and Engineering as Allies of Medicine," which was discussed by Dr. Frank H. Lahey of Boston, Professor George R. Harrison of the Institute, and Professor Detlev W. Bronk of Cornell University Medical College, whose papers appear elsewhere in this edition of *The Review*. Samuel C. Prescott, '94, Dean of Science at Technology, presided. Huntington Hall was thronged for the session, which, in its clear delineation of the unity of scientific activity, was especially appropriate to the day.

Supporting the discussions presented in the conference were extensive exhibits in the Main and Rogers lobbies showing apparatus developed by scientists and engineers for use in the diagnosis and cure of disease. The exhibits elicited much comment and attention.

### Tribute of a Trophy

THE Inter-Collegiate Yacht Racing Association recently placed in competition the George Owen Trophy, which has a significance far deeper than its importance as a prize in the annual Eastern College Dinghy Regatta. By those who know yachting, the new trophy is at once recognized as a very sincere tribute to George Owen, '94, Professor of Naval Architecture at the Institute and designer of yachts, whose name is known wherever sailing is a sport. In particular, the trophy is an expression of appreciation by college yachtsmen for the encouragement and very tangible assistance that George Owen has given to the development of intercollegiate yacht racing. His contribution to the establishment and growth of dinghy sailing at the Institute is already well known, for he designed the Tech-Herreshoff dinghy, of which the M.I.T. Nautical Association now has a fleet of forty, and has actively supported the sport since it was established at the Institute in January, 1936.

The George Owen Trophy is an exceptionally fine half-model of the yacht *Dorello*, one of Professor Owen's most successful designs. Mounted on a walnut plaque bearing an appropriate inscription, the trophy is the work of Elmer H. Peterson, technical instructor in model making in the Institute's Department of Naval Architecture and Marine Engineering.

The *Dorello*, which had no bowsprit and carried a club topsail, was the first of her class, and her rig was later known to yachtsmen as the "Dorello rig." Built by Hodgdon Brothers in Maine in 1908, she quickly claimed the attention of yachtsmen not only for the beauty of her lines but for her racing ability. For the first three years after she was launched she was sailed



M.I.T. Photo

*The George Owen Trophy*

by Professor Owen, then winning some fifty-eight races out of sixty-two starts. To the present time she has been in almost continual seasonal service, during which she has won many important races.

### Corporation Election

THOMAS C. DESMOND, '09, of Newburgh, N. Y., a member of the New York State Senate since 1930, was elected a life member of the Corporation at its meeting on June 10.

Mr. Desmond is a native of Middletown, N. Y., and before his retirement a few years ago was prominent in engineering work in various parts of the country. He was graduated from Harvard University in 1908, and holds the honorary degree of doctor of humane letters, conferred upon him by Union College in 1939. Mr. Desmond is president of Colonial Terraces Corporation and a director of Curtis and Curtis Company. He has been active in politics and professional engineering societies and prominent in Technology alumni affairs for many years.

### Graduation

AT the seventy-fourth graduation exercises of the Institute in Symphony Hall on June 10, President Compton awarded 711 degrees to 663 men and 13 young women. More than 95 per cent of the graduating class had already accepted positions, and an almost unlimited number could have been placed had they been available in such fields as meteorology or mechanical, aeronautical, or chemical engineering. (Concluded on page 458)

## NO SUBTLETIES TO PERPLEX

(Concluded from page 416)

inherited most of them and have become used to thinking of them as a matter of course. But they are *not* matters of course; we could lose them in any one of several ways infinitely faster than they were won for us in the first place.

The great threat to our rights — our liberties, our opportunities, our cherished way of life — right now is the threat of domination by the Nazi ideology, carried out by the Nazi organization. And believe me that threat is real to us right here in the United States, to us Technology Alumni in our lives and our jobs! It could come quickly or slowly, directly by force or indirectly through economic competition with essentially slave labor of conquered countries, or through gradual domination of our neighbor countries.

I do not want to appear to be an alarmist, but I do want to say most earnestly what I believe to be true, and I call as my witnesses Czechoslovakia, Poland, Denmark, Norway, Holland, Belgium, France, Rumania, Bulgaria, Yugoslavia, Greece, and any other nations who are rich in resources or strategic location and who have trusted in international honor and justice for their safety. And we know perfectly well that all others will be added to that list who can be conquered or bulldozed into it, and whose acquisition would strengthen or enrich Germany. And this certainly means us to whatever extent Germany may be able to get the better of us — by force or intrigue or fifth column.

So here, in this major problem which faces all Americans today, the issues again are very clear cut: Shall we strive to retain our way of life and all the rights which we have inherited, or shall we let them be stripped from us without serious resistance? Here again the needed virtues are simple and direct: courage, sacrifice, wisdom.

Very rarely have I spoken to urge a course of action or an attitude of mind or emotion. My training as a scientist is against it, and generally I believe in presenting the facts and leaving it to each analytically trained mind to draw its own conclusions and determine its own course of action. And so I do today, except that the issues seem to me to be unusually clear and are certainly unusually important.

Barring a miracle, it appears to me that we shall become involved directly in this war, and that before very long. This is a bare statement of probable fact, based on the trends. In honesty to you I should supplement this by saying that I personally believe that we *ought* to become involved just as soon and in whatever way as will most effectively join our forces to those of Britain in the effort to subdue this nearly world-wide attack on human rights and international decency, before it subdues us. I believe that the Axis powers will subdue Britain and South American countries and cause us at least terrible loss if they are allowed to take us one at a time, as is their habit. So I am forced to believe that all-out aid to Britain is our job, and that the nature of this all-out aid should be whatever will most effectively accomplish the result, without haggling over the phrases "war" or "short of war," and with the throwing of our full national strength into the effort.

You may or may not believe as I do in these matters, and I should not want you to agree with me or anybody else unless your own analysis of the facts and the probabilities leads you to that conclusion. But I do most earnestly hope that you are graduated from this institution with three qualities in your character: first, a high idealism in your relationships with your fellow men; second, courage to follow your ideal; third, wisdom to see how that ideal may be given practical expression, thinking of the future more than of the present.

If you, and all people of America, can have these qualities of idealism, courage, and practical wisdom, then I do not care so much whether Henry Jones or John Smith or Mary Taylor believes this or that particular thing. There will be various opinions on any debatable subject, and this diversity is one of the safeguards and one of the eternal springs of vigor of our democracy. The reason that I do not worry about what specific individuals think, is that I have the greatest of faith in the considered opinion of the majority, provided these qualities of idealism, courage, and wisdom prevail among them. And, in this critical time, the majority will determine our course. True, we have a certain amount of leadership, as every group must have. But this leadership is of our own election and I think I could demonstrate, if it is not already self-evident, that this leadership has not ventured away from what it believed to be the trend of public opinion.

Wherever your role is cast in the coming months, we know that you are equipped by training to be useful in that role. You have varied talents, you are of varied national backgrounds, not all of you are citizens of the United States, though I have been talking to you as if you were. But we are proud of you, just as we are proud of the way in which America has been able to fuse all elements into that versatile, interesting, and capable being which we call "an American." Our ambition is not to purify our race by purging from it the blood of minorities, but to perfect still further the art of co-operative living together in peace, prosperity, and liberal opportunity.

May God's blessing and help go with you as you go on to work, and perhaps to fight, to preserve a social order in which you and I and our children can live in peace, prosperity, and liberal opportunity.

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## THE TREND OF AFFAIRS

(Continued from page 414)

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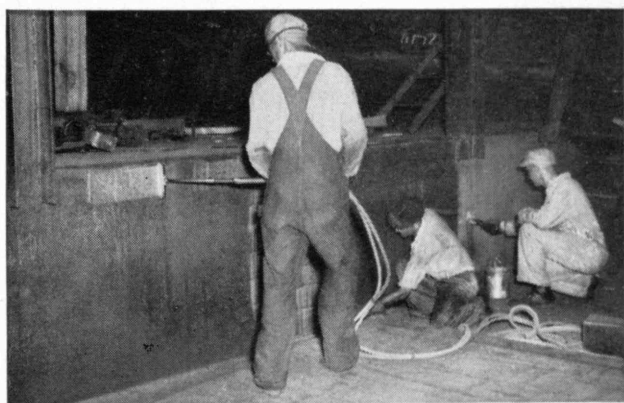
Casts made of this mixture, fired to temperatures of 1,010 degrees Centigrade, shrink as little as a quarter-inch in twelve inches. This shrinkage, approximating that of bronze, is slight enough not to detract from the artistic value of the cast. The strength of objects made from this slip is much greater than that of the Tanagra figurines. Professor Norton, by repeated experiment, found suitable flocculants which made it possible to compound a slip of proper fluidity without the use of a great deal of water. He also discovered that proper timing of the casting operation would allow for absorption of water from the slip (Concluded on page 438)



# OXY-ACETYLENE FLAME-PRIMING makes paint go on faster and last longer . . .

## 1. What it is and does

Oxy-acetylene flame-priming is performed by passing the flame from an Oxweld heating head over structural steel before the first protective coating is applied. The quick heat causes rust and loose scale to pop off, and drives out the surface moisture, thus leaving a clean, dry surface for the paint. Structures of any size or shape can be flame-primed in the shop or on the job.



## 2. How it helps

Flame-priming is followed by wire-brushing, and close behind this comes the painting. As a result the metal is clean, dry, and still warm—making the paint go on faster, bond tighter, dry quicker, and last longer.

## 3. What you need to use it

All you need to use this method is an Oxweld W-26 heavy-duty welding blowpipe and an Oxweld flame-priming head, connected to an adequate source of oxygen and acetylene supply. Any operator can learn the technique quickly.

With standard welding heads, you can use your flame-priming equipment for heavy welding, and for straightening, forming, and other heating operations.

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Linde can supply the gases, the apparatus, and help in using flame-priming. If you are interested in giving longer life to paint jobs—or if you are confronted with bottlenecks in using sand-blasting equipment—talk it over with Linde!

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## THE TREND OF AFFAIRS

(Concluded from page 436)

by the plaster of the mold. As a result, the cast when removed from the mold contains relatively little water, a fact which contributes to reduction of shrinkage. About ten satisfactory casts can be made from one set of molds before crumbling of the plaster makes new molds necessary.

Each of the advances here touched upon contributes to the rationalizing of ceramic techniques. For estimate of what this aspect of the program means in terms of sculpture, we may well turn to Mr. Demetrios, who finds in it the answer to several dilemmas besetting artists whose honest wish is that their creations may be more widely dispersed among the people than has been possible in the past.

As Mr. Demetrios sees it, the program has provided the sculptor with a means of controlling the production of a work of art all the way from the original modeling to the finished cast which the amateur of art acquires. Working toward bronze, the sculptor generally had to relinquish the casting and finishing operation to a foundry, and hence almost never did the final finishing of the work himself. His share in it consisted of modeling the head, making a plaster mold from the original clay, and producing a plaster cast. This went to the foundry to be cast in bronze. The soundly established technique of using terra cotta instead of bronze means that the artist himself can do the casting and the finishing operation which follows it. Moreover, the terra cotta permits ten reproductions to be made and cuts the cost of making them, thus pointing toward a wider availability of works of art among the people. In addition, the terra cotta which results from Professor Norton's formulas gives the sculptor a medium of a better grain and texture than even that of marble, so that after the cast has been baked, the sculptor can work on it in any direction, giving to the final reproduction the life and vigor attainable only by the direct application of artistic skill and sensitivity. Finally, a wide range of permanent colors is available for the finished piece. Not possible with other mediums, these colors, under accurate control, permit polychrome sculpture, which has been little used by modern artists.

## INDIVIDUALS AND INCENTIVES

(Concluded from page 421)

regulations on almost every form of business activity. The incentive for the laborer to work hard and get ahead tends to be reduced if he comes to feel that his future welfare is dependent more upon his labor union than upon his own efforts, and if seniority becomes the principal basis for promotion. Bonuses for not raising crops lower the farmer's incentive to work. Even desirable plans such as old-age pensions and work relief tend to reduce the incentive to work if they are carried too far.

The very incentive to invent is threatened by proposed legislation which would greatly reduce the value of a patent. The incentive to save for a rainy day is

being attacked and ridiculed by some of our self-styled intellectuals. We must work against such tendencies to weaken incentives if our democracy is to survive.

Management has a large share of responsibility in helping maintain proper incentives for labor and indeed for the entire personnel of business. This problem is not an easy one. Fair wages are, of course, the first fundamental; but money is by no means the only important incentive to the average American worker. Good working conditions, pleasant associates, and an understanding of how his work fits into the whole business help to stimulate interest and enthusiasm in an organization.

By and large I think the greatest thing management can do to provide worth-while incentives for the whole organization is to take every precaution to see that all workers up and down the line are treated fairly, that grievances are handled sympathetically, and that ability is recognized and promotions are made only after careful consideration of all available candidates within the organization.

It has always seemed to me that our hereditary instincts are sadly deficient in that, while they spur us to almost superhuman efforts to avoid the loss of a finger or a toe or other relatively unimportant physical member, we seem to have no instinctive sense of the pre-eminent value to us of that spirit of enthusiasm which is fortunately so characteristic of youth. In many individuals enthusiasm gradually atrophies as middle age approaches; small effort is made to nourish it, and little notice is taken of its disappearance. Yet how quickly we recognize the trait when we see it preserved in so many men clear up to a ripe old age, and how much it has to do with both the attainment of success and the enjoyment of life! The unique and vital nature of enthusiasm has long been recognized. Indeed, its very name, from the Greek words *en* and *theos*, literally means "God within." Guard that divine spark as your greatest asset, temper it with judgment and patience, and your rewards will be both material and spiritual.

## A BROADER BASE FOR SCIENCE

(Continued from page 418)

Needless to say, the gun, the knife, the automobile, and some modern drugs do give the individual bent on crime a wider range, a wider scope. With regard to science and war, however, neither science itself, its method or its spirit, nor scientists as a class can be held responsible for war, ancient or modern. No one denies that modern gadgets, developed out of our scientific understanding, render war more destructive and brutal today. But let me call your attention to the attitude of most of the men of science on this issue by quoting from the minute adopted in 1939 by the American Association for the Advancement of Science. This declaration reads as follows: ". . . *Science is wholly independent of national boundaries and races and creeds and can flourish permanently only where there is peace and intellectual freedom.* . . ."

As to unemployment, I think President Compton made clear not very long ago that, while some inventions may produce temporary unemployment or dislodgment of labor, the total (Continued on page 440)

# EDISON

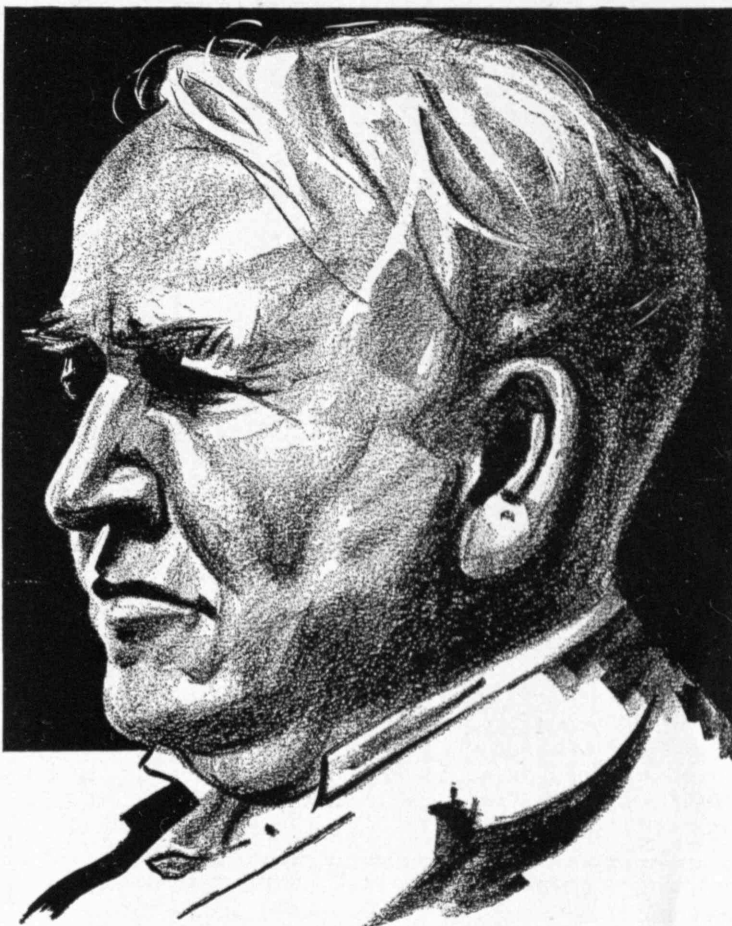
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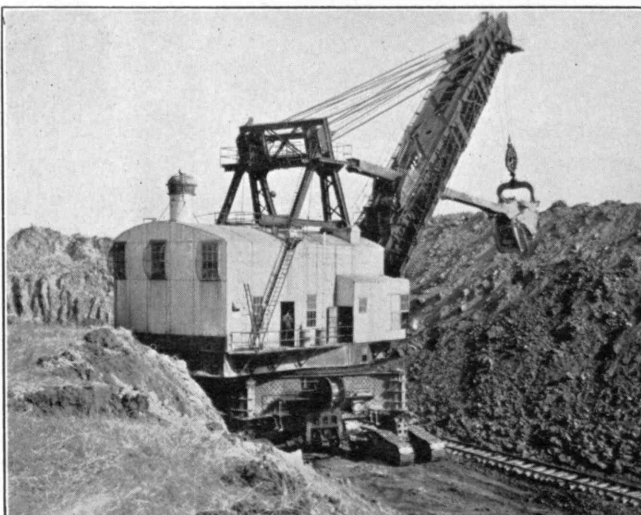
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## TIREX CABLE

because it is both tough and dependable  
was used for this shovel

Simplex Wire & Cable Co.  
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## A BROADER BASE FOR SCIENCE

(Continued from page 438)

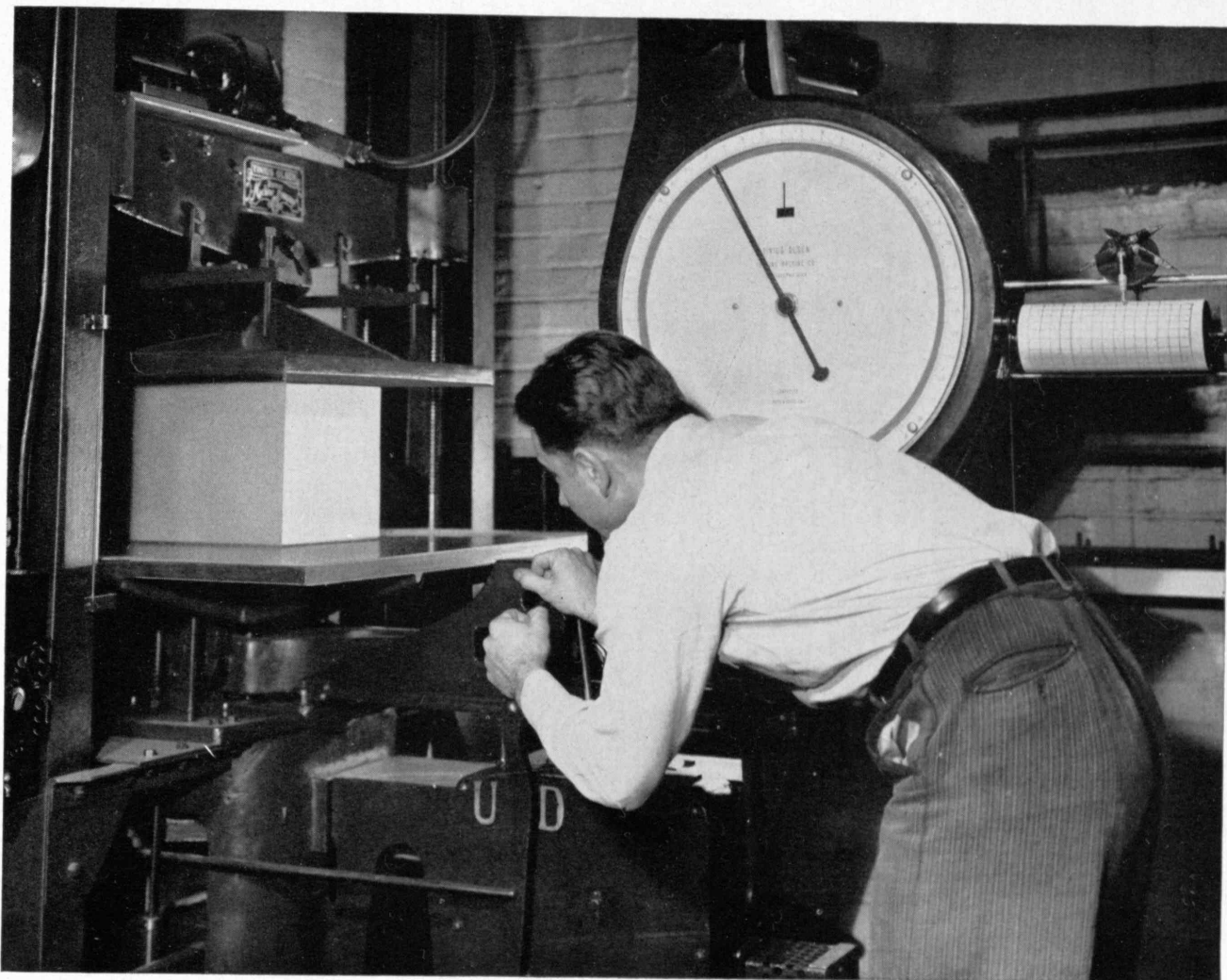
effect of new inventions is to increase employment of labor. Certainly, the growth of cities, inhabited by people not directly engaged in securing sustenance from the soil, would have been absolutely impossible without the inventions stemming from science, both industrial and transportation.

I think the last two charges against science are the most serious, though they reflect less on science and more on man, more on human nature, human selfishness, and human myopia. I think there is no doubt that some gadgets developed through practical applications of scientific knowledge render it possible for myopic man to deplete and waste natural resources at a rate that could not occur by the aid of the bare hands, the crowbar, the spade, the ox, the horse, or the mule. As an example I am thinking of the strip mining of soft coal in my own state of Illinois, where tens of thousands of acres of fertile soil, soil rendered fertile by the processes of nature during perchance more than 100,000 years, are ruined for agriculture, for the production of food and clothing for man, in order to get a few tons of soft coal mined at less expense, for a few pennies of profit for a few individuals. To me, this is not an indictment of science or the application of science; it is an indictment of individual myopia and of social and economic statesmanship in our democracy.

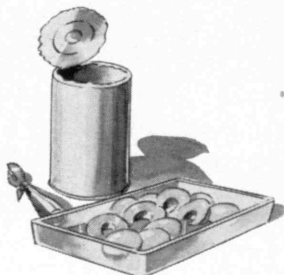
That the applications of science in the growth of modern industries have created a serious individual public health problem under the head of industrial disease, is known to all. Our modern science of medicine is effectively combating this menace, although it is not entirely under control as yet. A sobering thought is the fact that, in the development of industries due to our expanding understanding of nature, man is increasingly and suddenly exposed to chemical substances formerly unknown to him in the whole history of the race or is exposed to substances of injurious potentialities in larger and larger amounts. If we could really establish a broader base for science in society, and by science I include the science of modern medicine and modern preventive medicine, we should soon effectively control this growing hazard. At present we go at things too blindly and we (society and the medical profession) assume that as long as the individual exposed to industrial hazards is not actually sick enough to call a doctor, he is not really injured. Frequently we have discovered, and we shall probably increasingly discover, that this is not the true situation.

To refer again to the charge that science makes war or makes war more violent, I think we may admit that, unless the spirit of science — honesty coupled with the sense of justice and fair play — manages to keep pace with our expanding scientific knowledge and its practical applications, man may destroy himself in days not so very far away, and the insects will rule the world without having to fight man for its possession.

Science is still in the ivory tower to the extent that our laborers, our farmers, and even our leaders in politics, trade, and industry do not understand or at least do not follow the scientific method. Hence I insist that ours is not yet an age of science, (Continued on page 442)



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You may not have realized it, but this is just as true of shipping boxes as it is of canned goods!

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## A BROADER BASE FOR SCIENCE

(Continued from page 440)

for the character of the age is writ by man's behavior. Men are still driven by greed and confused by guile, rather than guided by reason and justice based on our expanding scientific knowledge. I said on another occasion, but the thought bears repeating here, that science has greatly enlarged man's understanding, conquered many of his diseases, lengthened his life, multiplied his joys, decreased his fears, and added much to his physical comforts and powers. Man may use these and other achievements for a greater social injury instead of for a further social advance. Science is specifically human, in that it stems from the innate curiosity of all men and the conspicuously plastic brains of the ablest, if not the noblest, of our fellows. If this be so, then the scientific method and its products cannot be, in any fundamental and permanent sense, in conflict with human nature, though our present human society, product of a past dominated by greed, force, and fear, may be and is in conflict with the scientific method. Whether science and the scientific method, even on the broader social base for which I plead, can contrive survival values equal if not superior to the blind forces of nature which shaped man's past, is as yet in the laps of the gods. Still, we cannot deny the possibility, and we *will* nurse the hope, that the hairy ape who somehow lost his tail, who grew a brain worth having, who built speech and song out of a hiss and a roar, and who stepped out

of the cave to explore and master the universe, may some day conquer his own irrational and myopic behavior toward his kin.

I think we can say, even in the face of current fear and pessimism, that during the ups and downs of past ages, man has through science gradually acquired more understanding and hence more freedom from fear, more dignity, greater kindness, and a clearer conception of justice. Despite the fact that for the moment "the bird of sorrow" is not only flying over our heads but is actually nesting in our hair—to borrow a Chinese proverb—that bird will not nest in our hair forever, even though a blackout on the light of science is decreed in every land. When we have achieved the broader base for science in the understanding of the common man, the method of science will slowly but surely help to make life more intelligent, toil more cheerful, fear, hatred, pain, and tears less prevalent in our lives. If in any place or time the insane violence of war renders the pursuit of science impossible and the scientific method submerged and forgotten, it will be rediscovered in better days by better men. At least up till now man has demonstrated his ability to survive and to reassert his manhood and his intelligence.

The establishment of a broader base for science is too great a task for the handful of scientists in our universities and in our institutions for scientific research, even were these men agreed that this is both an important and a desirable goal. What is called for is the cooperative effort of all men and (Concluded on page 444)

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• *Elevators today* have an unparalleled safety record. In fact, it is virtually impossible for a passenger to injure himself in a modern elevator.

## A BROADER BASE FOR SCIENCE

(Concluded from page 442)

women with sufficient training in science to comprehend and follow the scientific method. These are principally the large armies of physicians, industrial chemists, and engineers, and the scattering of competent teachers of science in our secondary schools. Perchance the newly born Association of Scientific Workers will lend a hand. All teachers in our secondary schools, were they themselves conditioned in the spirit of science and aware of the scientific method, could be the spearhead of this advance. The scientific method, the achievement of understanding by controlled experience, has not yet had much of a chance in our formal education, on any level.

We pride ourselves, I think without good grounds, that our age is the "age of science." As Arthur H. Compton recently put it, ours is an age of science only in the sense that the applications of science, the fruits of science, influence our external mode of living, both in peace and in war, to a much greater extent than they have at any other period in human history. But even today guile and deceit, violence and war, hate and vanity — the very antitheses of science, the very negations of the method and the spirit of science — are just as rampant as in the days of the cave man and the saber-toothed tiger.

When the twilight beckons men of my years, we still have our children, we still have our dreams. I dream of

a day when through social experience in science and justice we shall actually put the principles of democracy to work within our land — in politics, in industry, in trade, in education; when understanding and kindness will more than hold their own against guile and greed; when force and violence are replaced by conference, compromise, and approximate justice in all our domestic relations. When that day is at hand in our own land, our example will be a greater impetus to science, peace, and justice in other lands than are our present speeches and our lend and lease of the implements of violence and war to all present and potential democracies of the world. For then we at least will be strong enough to fear no ill wind from across any ocean, strong enough to maintain our own ways of life, a life worth living for a million years.

## ARMING THE PHYSICIAN

(Continued from page 425)

apart. Hence a factor of 2.5 still exists between present realization and that which can conceivably be reached with the existing instrument.

Will the physician be satisfied with the present realization? No. With a possible factor 2.5 times better? Yes. After all, there must be a lower limit to the size of living matter, for all bacilli, like all men, are made of atoms. We know that atoms are about four-billionths of an inch in diameter. Since (Continued on page 446)

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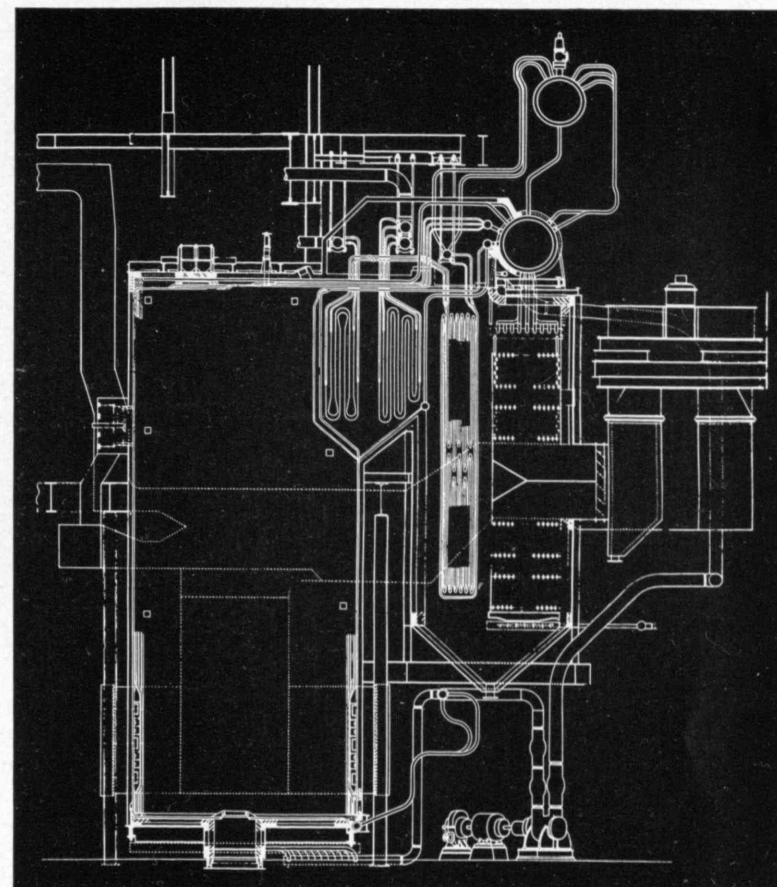
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## ARMING THE PHYSICIAN

*(Continued from page 444)*

several atoms are needed to make a molecule, molecules are certainly larger than atoms. The smallest living unit must be at least as large as a moderately complex molecule; so we can set twenty-billionths to forty-billionths of an inch as the probable lower limit of the size of living matter. Thus we find the electron microscope on the verge of fulfilling all the needs of the physician for the photography of small living objects. Although much needs to be done, most of the problems which remain are of the character of biological engineering.

The spectrograph is a much older instrument than the electron microscope, but only recently has its extensive applicability to medicine been realized. Primarily an analytical instrument, the spectrograph can be used for measuring the presence of metallic constituents in the blood, the potency of vitamins, the activity of hormones, and for similar problems involving the determination of very small concentrations of material.

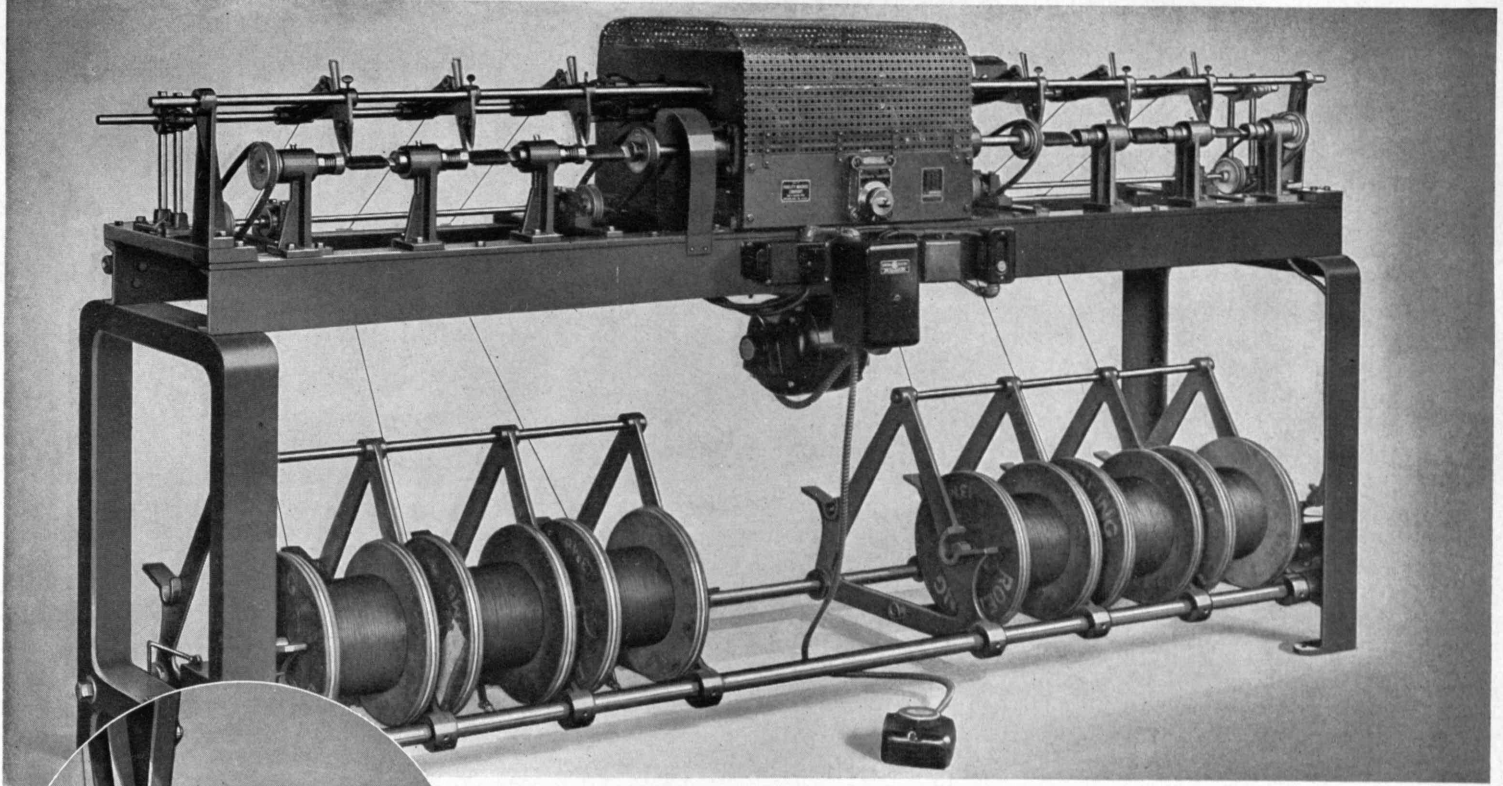
The basic principle of the spectrograph is that it detects the light which atoms and molecules can be made to emit and with this light produces spectrum lines which are arranged in such simple and reproducible patterns as always to give a definite clue to the kinds of atoms or molecules which have emitted the light, and, somewhat less definitely, to the number of each present.

If a physician suspects that a patient is suffering from lead poisoning, he need take only a drop of blood from the patient's ear and burn this blood in an electric arc. The blood, quickly dried by the intense heat of the arc, is burned to ashes, and the very molecules of the ashes themselves are then rent apart into their constituent atoms. The atoms are bombarded by an intense hail of electrons in the arc and are thereby caused to emit light. Any lead atoms present send forth the characteristic light waves of lead, which the spectrograph reveals as spectrum lines in definite locations.

On the same photographic plate the physician records a flash of light sent through the same spectrograph from a drop of normal blood burned in the same arc. He knows the lead content of the normal blood, and by comparing the blackening of the lead lines in the two spectrum photographs is able to determine the amount of lead in the sample taken from his patient. It is possible to measure as little as one atom of lead to a million molecules of blood. In fact, by means of the spectrograph the increase in the lead content of the blood of a person who has slept for one night in a newly painted room can be determined.

The identification of an element depends on the precision with which the spectrograph can determine the wavelengths of the light which the element emits. With the finest type of modern spectrograph, the lengths of these waves can be measured to one part in sixty million. Since the waves are themselves usually less than 1/50,000 of an inch long, the spectrograph can thus be used to make a measurement accurate to one-third of a trillionth of an inch.

When a biological material is burned in an electric arc, the material is destroyed. Analyses of transparent materials, however, can be made *(Continued on page 448)*



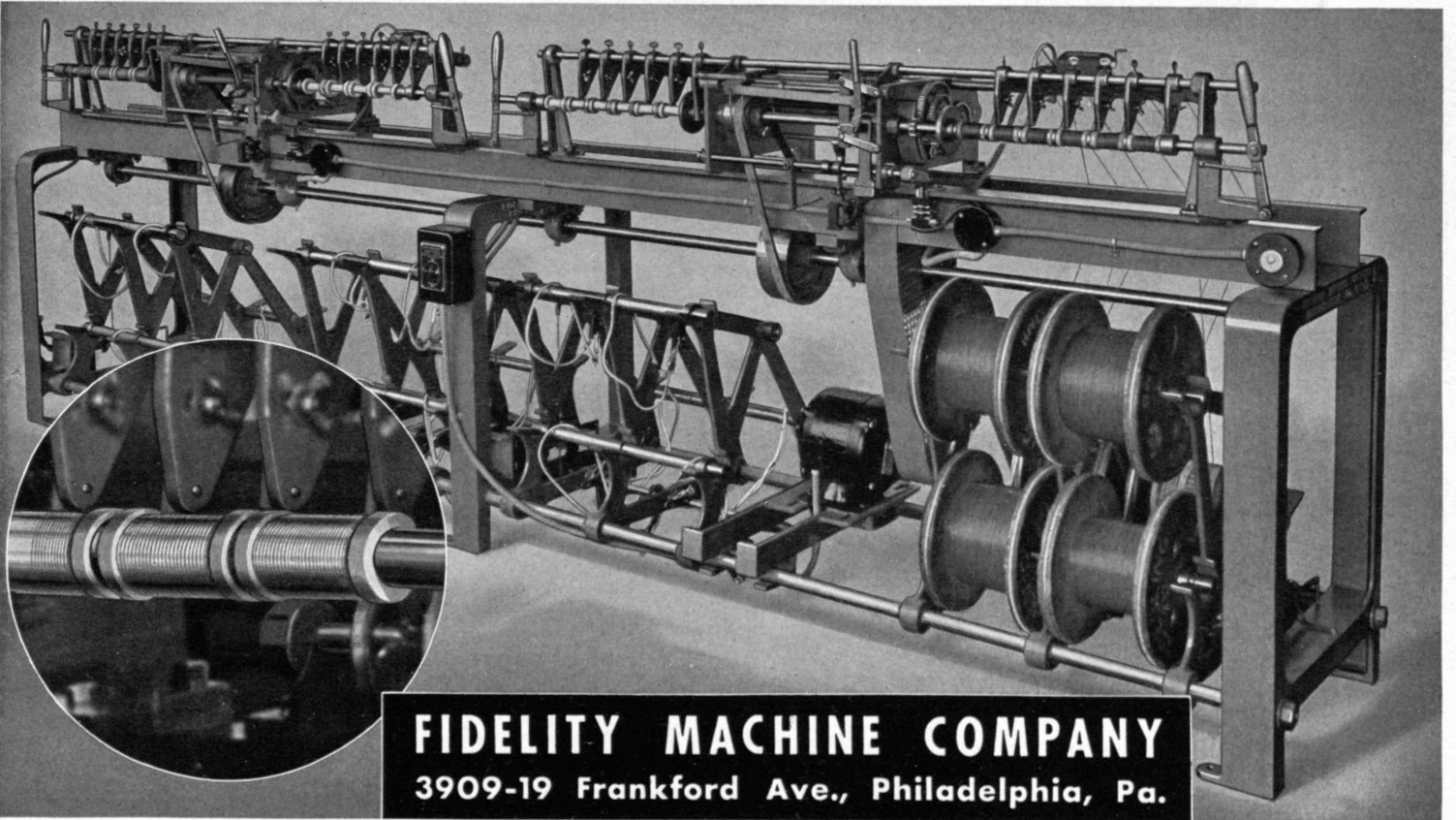
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## ARMING THE PHYSICIAN

(Continued from page 446)

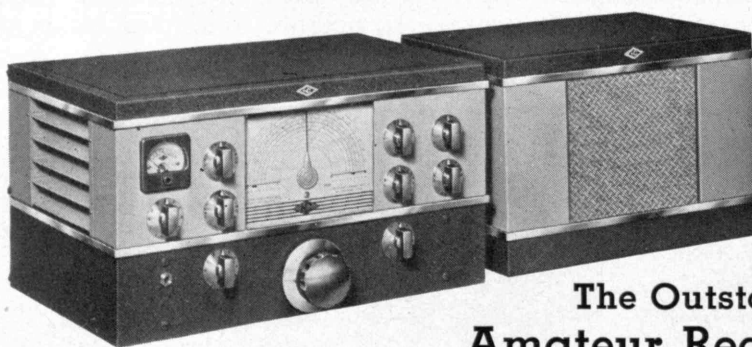
with the spectrograph in a way which does not involve destruction: A beam of light — infrared, visible, or ultraviolet light — is sent through the sample, and the presence of various complex molecules is determined from observation of the absorption of the light of different wavelengths in its passage through the sample. This method has found particular application in the determination of vitamin A in various food materials.

Finally, let us consider devices for the production of atomic rays. Though we are likely to think of an atom as a small sphere about four-billionths of an inch in diameter, actually an atom has proportionately as much empty space in its volume as has the solar system, and atoms are now easy to take apart. Every atom contains a nucleus composed of protons and neutrons, surrounded at appropriate distances by some definite number of electrons between one and ninety-two. To knock electrons out of atoms is quite easy, and is done in every electric arc, neon sign, and radio tube. To knock protons, neutrons, and larger subatomic chunks out of the atomic nucleus is much more difficult, and is what physicists have been engaged in doing in their recent atom-smashing experiments. All of the subatomic particles are extremely small, of the order of forty-quadrillionths of an inch — small bullets, indeed, to hurl at a speed of thousands of miles a second at a target no larger than the bullets. No aiming is possible under

these circumstances, of course. A sufficient number of subatomic missiles must be hurled to score, just by probability, the desired number of direct hits on a nucleus. Even if only one bullet out of a million strikes the target, a billion shots will give a thousand hits.

The easiest way to get these minute missiles moving is to make use of the fact that protons, electrons, and the nuclei of atoms in general when stripped of their electrons, are charged electrically. Thus very large electrical forces will be brought to bear on them when they are placed in an intense electric field. In order to allow them to accumulate speed by falling over the electrical precipice which is provided by a high-voltage generator, everything must be cleared out of their path, and the easiest way to do so is to put them in a large closed container and pump out as much of the air as possible. In this way the high-voltage vacuum tube came into being.

The ordinary x-ray tube as used by the physician for taking shadow photographs of bones and other parts of the human body is such a vacuum tube on a small scale. When electrons are slammed at high speed against atoms, x-rays are produced. These x-rays, which are only about 1/4,000 as long as light waves, will burn up any biological material if a sufficient dose is given. For many years physicians have used x-rays in the treatment of malignant cells which must be burned out of the body. The problem is to discover how to burn deep-lying malignant cells without causing the deaths of too many normal cells which will inevitably be struck by the rays. One can obtain a certain degree (Concluded on page 450)

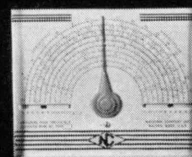


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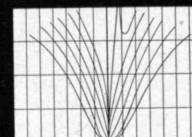
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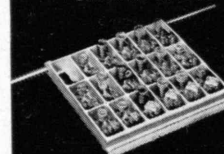
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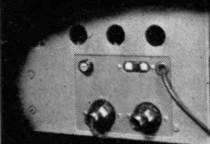
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## ARMING THE PHYSICIAN

(Concluded from page 448)

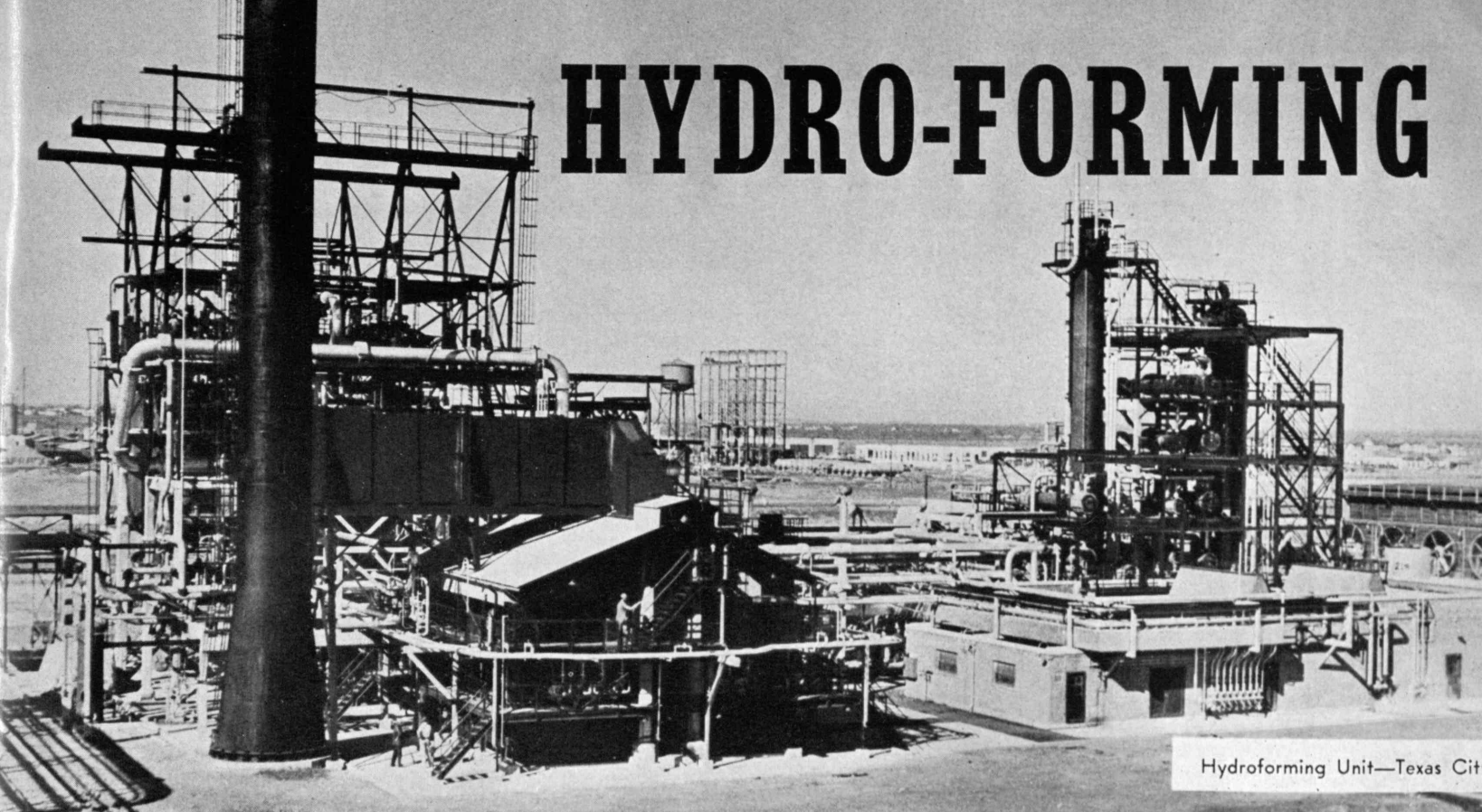
of control by varying the voltage on the x-ray tube. The higher the voltage across the tube, the faster will the electrons move through the tube and the shorter will be the waves of the x-rays produced. The shorter the waves, the more deeply will they penetrate flesh before being absorbed. To reach really deep-lying malignancies, x-ray tubes with millions of volts supplied to their terminals are needed, and these the atom-smashing devices of the physicists have furnished.

Apparently x-rays destroy cells by setting high-speed electrons free in them. The destruction of a cell is believed to occur when the cell is bombarded by a sufficient number of electrons to break up a large number of the molecules in it. It does not matter whether x-rays are used to produce the electrons in the cells, or whether electrons are hurled directly into the cells from vacuum tubes, although the latter method may possibly give improved control over the bombardment. But in order to send electrons directly into cells instead of using x-rays as an intermediary agency, it is necessary to have tubes of much higher voltage.

Radium treatments for malignancies are in reality the same as high-voltage x-ray treatments, inasmuch as the radium atom can be thought of as a small portable x-ray outfit which, when the atom explodes, gives x-rays equivalent to those produced by a tube operated at about three million volts. Radium, however, has many undesirable properties, one of them being that you can never tell when a radium atom is going to blow up. If radium gets into the body, the radium atoms will continue to explode indefinitely; only half will be gone at the end of 1,680 years.

By being bombarded with subatomic particles, ordinary atoms can be transformed into radio-active atoms of new species, which explode quite as violently as, but sooner than, atoms of radium. The medical man can now choose his atom: If he wants a radio-active material that will be half gone in twenty-one minutes, he may choose radio-carbon; for a half life of fifteen hours, radio-sodium is available; and for eighty-eight days, radio-sulphur. Several hundred such atoms have been produced by physicists to date, and new ones appear almost monthly.

Thus the new high-speed atomic-ray devices of the physicist are of great value to the physician. Two lines of development are going on simultaneously: The high-voltage apparatus builds up a great electrical precipice over which subatomic particles can be hurled. The cyclotron, which uses comparatively low electrical pressures, imparts speed to the particle by whirling it in a magnetic field, applying a new impulse each time the particle circles the field. The cyclotron gives the particle velocities equivalent to those which would be obtained in a vacuum tube operating at ten million to twenty million volts. Both the high-voltage generator and the cyclotron are still undergoing improvements. Wherever their development may lead, we can be sure that these devices will be providing the physician with an increasing number and variety of subatomic particles for curative and diagnostic purposes.



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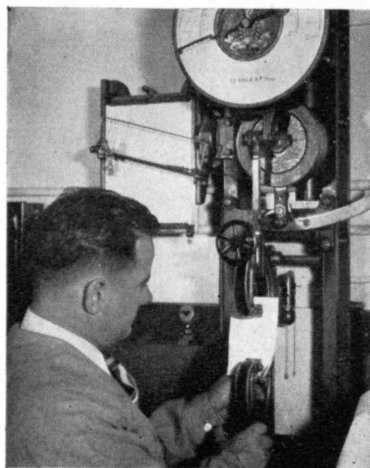
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## UNION FOR UNDERSTANDING

*(Continued from page 452)*

emphasis on preventive medicine, on public-health and sanitary engineering, and on industrial hygiene indicates the trend. Engineering and physics will necessarily play a major role in these phases of medicine, and the M.I.T. is in a unique position to lead this movement through its courses in biological engineering and public-health engineering.

The necessity for such an emphasis on the biological requirements of normal man in modern society is partly a result of our increased knowledge concerning the influence of the physical environment on the living organism and has been forced upon us as a direct consequence of the machine age. For, speaking generally, a machine is a device whereby man alters his relations to his natural surroundings. By the greater use of tools and technology, man has rapidly altered his physical surroundings and the conditions which affect his life.

The accomplishments of our technological civilization have been spoken of customarily as "man's conquest of nature." The phrase is an arrogant misrepresentation. Actually, through the physical sciences man has gained an understanding of certain laws describing natural phenomena, and through this understanding has been able to adapt himself more effectively to his environment. He has thus been enabled to utilize natural forces for his needs and his desires. But the value of these developments to man depends not only upon knowledge of the laws of the physical universe but also upon how this knowledge is utilized in relation to the human organism.

There is a gradual realization that the environment and the habits of man have been greatly altered, but with little regard for the well-being of the central figure in the whole drama. I believe, therefore, that future engineers and physicians will join in a greater concern for the relation of man to machines and to the products of machines — of man to a man-made environment. We are being forced to consider the biological results of travel at high velocities and high altitudes, the effects upon a human organism of daily work in gaseous atmospheres unnatural to man or of the new routines of life required by our industrial system. Moreover, architects are beginning to think not only of the materials they employ but of the biological requirements of the living organisms who are to inhabit their structures; city planners adjust their designs to the same needs.

These are signs of real promise for human welfare. They represent the initiation of a movement toward what Lewis Mumford calls the "biotechnic civilization." In order that this movement may be wisely directed, to the end that our knowledge of the material world shall be effectively employed for the well-being of man, we must have a better understanding of the effects of the physical environment upon the living organism. Such an understanding depends upon a knowledge of how the activity of the body is modified by its surroundings. This is the problem of human adaptation. It can be solved only by those of thorough training and broad interest in both the medical and the physical sciences.

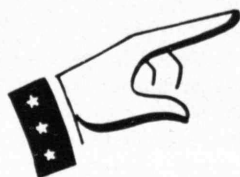
*(Concluded on page 456)*

*"—for want of a nail a shoe was lost; for want of a shoe a horse was lost; for want of a horse a soldier was lost; for want of a soldier a victory was lost; for want of a victory a kingdom was lost."*

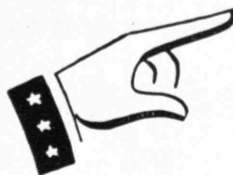
# for want of a NAIL

Don't let the need for a nail—or a special type of gummed tape, or any other of your so-called secondary supplies, slow you down.

## WHEN YOUR REQUISITIONS CALL FOR



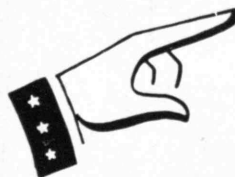
FLAT GUMMED PAPERS  
In white and 60  
different colors



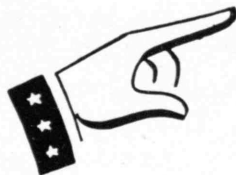
HOLLANDS and  
CAMBRICS



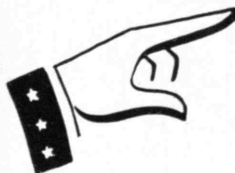
BRUSH ENAMEL OR  
PLATED PAPERS  
Gummed or Ungummed



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BOX COVERINGS



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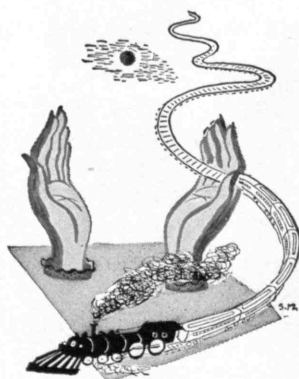
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## UNION FOR UNDERSTANDING

(Concluded from page 454)

The technological developments that have so profoundly altered the environment and customs of the individual man have also fostered new social and economic systems. The specialization characteristic of modern industry has created new economic relationships between individuals. Changes in methods of transportation and communication have completely transformed the social and political life of man from the day of Plato, who prescribed a population of five thousand as the desirable size of a city because this was the number of persons who could hear the voice of a single orator.

We have, therefore, evolved economically and politically against a background of scientific progress. But not always in this economic and political evolution have we had any very clear conception of the relation of the changing system to the human unit of society. This is, however, an essential relationship, for the contacts of most men with natural forces are largely through the medium of society. Their food supply depends upon the social system, as do their shelter against the elements, their protection against contagious disease or physical violence threatened by their fellows. Thus, the relation of man to his environment is largely determined by the social system of which he is the component unit. Because the functions of the social organism are the integrated activity of groups of human organisms, a more adequate understanding and control of social and economic institutions will be aided by a better understanding of the behavior of man and of the physical forces which determine that behavior. The co-operation of physics and medicine in achieving this understanding will make possible a wiser direction of the future course of our industrial civilization. This relationship is, I believe, the greatest opportunity for mutual influence and co-operative effort which is available to the physicist and the physician.

## SCIENCE, ENGINEERING, MEDICINE

(Continued from page 428)

pharmacy and chemistry and the council on foods of the American Medical Association, represent the views of a number of authorities who have endeavored to summarize the available knowledge on certain phases of vitamin study.

*Annual Review of Biochemistry* (edited by James Murray Luck). Vol. 1, 1932, to date. Stanford University, Calif.: Stanford University Press. \$5.00 a volume.

*Cold Spring Harbor Symposia on Quantitative Biology*. Vol. 1, 1933, to date. Cold Spring Harbor, N. Y.: the Biological Laboratory. \$4.50 a volume.

EDDY, WALTER H. *What Are the Vitamins?* New York: Reinhold, 1941. Pp. 247. \$2.50.

Not a popularization, but a concise summary of information based on vitamin research and literature.

HARVEY, E. NEWTON. *Living Light*. Princeton: Princeton University Press, 1940. Pp. xv+328. \$4.00.

"Describes not only outstanding forms of life that produce light but also the mysteries relating to the chemistry, physiology and physics of animal light." — H. G. Garbedian in the *New York Times Book Review*, February 2, 1941.

NEEDHAM, JOSEPH, and DAVID E. GREEN (editors). *Perspectives in Biochemistry*. New York: Macmillan, 1937. Pp. viii+361. \$4.75. Thirty-one essays presented to Sir Frederick Gowland Hopkins by past and present members of his laboratory.



STEPHENSON, MARJORY. *Bacterial Metabolism* (2d ed.). New York: Longmans, Green, 1939. Pp. xiv+391. \$7.50.

VISSCHER, MAURICE B. (editor). *Chemistry and Medicine*. Minneapolis: University of Minnesota Press, 1940. Pp. v+296. \$4.50.

BLICKE, F. F. "Development of New Organic Chemicals for Therapeutic Use," *Journal of Laboratory and Clinical Medicine*, 26:131-138 (October, 1940).

CROSSLEY, M. L. "Recent Advances in Chemotherapy," *Science*, 91: 369-373 (April 19, 1940).

TUVE, M. A. "The New Alchemy," *Radiology*, 35:174-183 (Aug., '40).

#### IV. ELECTRICITY AND MEDICINE

ADRIAN, E. D. *The Mechanism of Nervous Action: Electrical Studies of the Neurone*. Philadelphia: University of Pennsylvania Press, 1932. Pp. x+103. \$2.00.

ERLANGER, JOSEPH, and HERBERT S. GASSER. *Electrical Signs of Nervous Activity*. Philadelphia: University of Pennsylvania Press, 1937. Pp. x+221. \$3.50.

LANGWORTHY, O. R. "Uses of Electricity in Medicine," *Electrical Engineering*, 59:389-394 (October, 1940).

WILLIAMS, R. E. "Electricity in Medicine," *Electrical Engineering*, 57:237-244 (June, 1938).

#### V. MATHEMATICS AND MEDICINE

DAHLBERG, G. *Statistical Methods for Medical and Biological Students*. New York: Interscience Publishers, 1940. Pp. 232. \$2.75.

DAVENPORT, C. B., and MERLE P. EKAS. *Statistical Methods in Biology, Medicine and Psychology* (4th ed., completely revised). New York: Wiley, 1936. Pp. xii+216. \$2.75.

FISHER, R. A. *Statistical Methods for Research Workers* (7th ed.). Edinburgh: Oliver and Boyd, 1938. Pp. xv+356. 15s.

PEARL, RAYMOND. *Introduction to Medical Biometry and Statistics* (3d ed., revised and enlarged). Philadelphia: Saunders, 1940. Pp. xv+537. \$7.00.

RAHN, OTTO. *Mathematics in Bacteriology*. Minneapolis: Burgess Publishing Company, 1939. Pp. 63. \$1.75.

The compiler wishes to thank the following members of the M.I.T. staff for suggestions in the compilation of this list: John R. Loofbrow, Associate Professor of Biophysics; Dr. John W. Williams, Associate Professor of Public Health Laboratory Methods; Robley D. Evans, Associate Professor of Physics; and Marguerite Chamberlain, Eastman Librarian. Copies of this list and the preceding ones may be obtained upon application to the Institute Librarian.

## PROGRESS REPORT

(Concluded from page 423)

patient's shoulder blade, and four to six of the pellets are inserted. They last for about eighteen months and act as a complete substitute for the adrenal gland. Patients can live happily, without any trouble at all except for the necessity of returning every eighteen months to have the little pellets slipped under the skin.

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## THE INSTITUTE GAZETTE

(Concluded from page 435)

The 676 recipients of degrees included 35 graduates, who, having completed five-year courses, received both bachelor's and master's degrees. In all, 478 bachelor's degrees were awarded, of which 14 were bachelors in architecture; two, bachelors of architecture in city planning; and 462, bachelors of science. Of the bachelors of science, 70 were awarded to graduates of the School of Science and 392 to graduates of the School of Engineering.

The advanced degrees included 22 doctors of philosophy, 25 doctors of science, one master in architecture, two masters in public health, and 183 masters of science. In addition to the academic degrees, five certificates in public health were awarded. Commissions in the Officers' Reserve Corps of the United States Army were awarded to 96 members of the graduating class.

### The Gardner Fellowship

**H**ONORING Harry W. Gardner, Professor of Architectural Design, who has been associated with the Institute's School of Architecture since 1895, the year after his graduation, the traveling fellowship of the School was named in May the Harry Wentworth Gardner Traveling Fellowship in Architecture. In making the announcement, Walter R. MacCormack, '03, Dean of the School, declared it appropriate that the fellowship be named "for a man who has given all of his professional life to teaching and who has left such a deep impression on so many architects in America because of his effective teaching and devotion to his work."

Through his long association with the School, his comprehension of its ideals, and his keen judgment, Professor Gardner has exerted wide and beneficial influence on students for years in addition to serving them as their teacher. His profound knowledge of color and design, as well, have been accessible to the Institute, in ways ranging from the decorative themes of commencement and other festivities to the unified color treatment of interiors of Technology's buildings and the decoration of individual rooms. The fellowship which bears his name succeeds the earlier Arthur Rotch Traveling Scholarship.

### Finale

**A**NNUAL reports constituted the bulk of the business before the Alumni Council at its 221st meeting, final one for the academic year, on the last Monday in May. Henry E. Worcester, '97, presided and introduced the officers elected for next year: B. Edwin Hutchinson, '09, President; Harold Bugbee, '20, Vice-President; Herbert S. Cleverdon, '10, and C. Yardley Chittick, '22, executive committeemen.

Speakers of the evening were John E. Burchard, '23, who described life in Washington as the present emergency has affected it; Raymond D. Douglass, '31, who described the national defense courses at the Institute; and President-elect Hutchinson, who discussed national defense work from the industrial point of view.

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*(as of June 7, 1941)*

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EMPLOYMENT STATUS	<i>Recipients Doctor's Degree</i>		<i>Recipients Master's Degree</i>		<i>Recipients Bachelor's Degree</i>		<i>All Groups</i>	
	No.	%	No.	%	No.	%	No.	%
1941 GRADUATES as of June 7, 1941								
Have Accepted Employment . . . . .	46	95.8	185	96.8	414	93.5	645	94.5
Unclassified . . . . .	2	4.2	6	3.2	29	6.5	37	5.5
TOTALS . . . . .	48	100	191	100	443	100	682	100

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CHECK LIST OF THE ACTIVITIES AND ACHIEVEMENTS OF M.I.T. ALUMNI AND OFFICERS

## Written

- ¶ By HERMANN C. LYTHGOE '96, "The Olive-Oil Racket," *Nucleus*, February.
- ¶ By JAIME GURZA '03, *Esta Guerra Sin Hitler*, Editorial Polis.
- ¶ By TENNEY L. DAVIS '13, *The Chemistry of Powder and Explosives*, Volume I, Wiley.
- ¶ By EVERETT ST. JOHN '13, "Aerial Cable Lashing Machine," and by JAMES A. CARR '20, "Lashed Aerial Cable," *Bell Laboratories Record*, May.
- ¶ By RICHARD H. SMITH '18, *Engineering*, Bellman Publishing Company, Inc.
- ¶ By JOHN A. WEST, JR., '39, compiler, "Out of the Blackout," National Fire Protection Association *Quarterly*, April, part 1.
- ¶ By WILLIAM E. WICKENDEN, former staff, "The University, Science, and Industry," Engineering Experiment Series, Ohio State University, March.

## Eastern Photoelasticity Conference

¶ WILLIAM M. MURRAY '33, as chairman of the local committee, officially opened the conference at Technology on June 12. EDWARD L. MORELAND '07 welcomed the visitors. Technical sessions were presided over by Dr. Murray and JOSEPH S. NEWELL '19. Speakers included ROYAL WELLER '27, on "Three-Dimensional Photoelasticity by the Scattered Light Method"; DAVIS R. DEWEY, 2d, '40, on "Visual Studies of Fluid Flow Patterns"; FRANK S. WYLE '41, on "Some Photoelastic Studies in Dynamics"; RAYMOND A. FRIGON, G, "Report of E.P.C. Committee on Materials Research"; and AUGUSTO J. DURELLI, guest student, on "New Method of Obtaining Isostatics in Photoelasticity."

## Speakers

- ¶ JOHN E. BURCHARD '23, on "Reconstruction of the Devastated Areas," at the third round-table conference of Princeton architects, Princeton, N.J., June 7.
- ¶ PATRICK J. HARNEY '31 and EULOGIO VAZQUEZ '36, at the first symposium on hurricanes, southeastern organization meeting of the American Meteorological Society, Miami,

Fla., May 9. SVERRE PETTERSEN, staff, directed the afternoon discussion.

¶ ROBLEY D. EVANS, staff, on "Atom Smashing and Its Modern Applications," at the eleventh conference of science students of Connecticut Valley colleges, South Hadley, Mass., April 12.

## Honor

¶ To GODFREY L. CABOT '81, EDWARD L. BOWLES '22, CHARLES S. DRAPER '26, and RALPH C. YOUNG '29, by their election to fellowship in the American Academy of Arts and Sciences; to HUDSON HOAGLAND '24, by his election as recording secretary; and to HORACE S. FORD, staff, by his election as treasurer.

¶ To FRANK N. EMERSON '01 and ALBERT HARKNESS '12, by their election to fellowship in the American Institute of Architects.

¶ To HAROLD B. HARVEY '05, by his re-election as western vice-president, national director, and chairman of the forging division of the Aluminum Association.

¶ To HARVEY S. BENSON '12 and WILLIAM R. HAINSWORTH '21, by their election as term members of the executive committee of the Industrial Research Institute. MAURICE HOLAND '16 serves on the same committee.

¶ To RUDOLF E. GRUBER '16, by the awarding of an honorary doctor of science degree by the New Jersey College of Pharmacy, Rutgers University, Newark, June 4.

¶ To HAROLD E. EDGERTON '27, by the awarding of the Potts Medal of the Franklin Institute on May 21.

¶ To CHARLES W. MACGREGOR, Staff, by the awarding of the Charles B. Dudley Medal of the American Society for Testing Materials, Chicago, June 25.

## DEATHS

\* Mentioned in class notes.

- ¶ CHRISTEL ORVIS '70, May 8.
- ¶ WILLIAM E. BROTHERTON '73, May 21.
- ¶ ROBERT ROGERS '81, April 21.
- ¶ WILLIAM C. MERRYMAN '83, May 30.
- ¶ GEORGE E. GUTHRIE '84, May 12.
- ¶ DWIGHT BRAINERD '87, April 20.\*

¶ WILLIAM H. BRAINERD '87, May 8.\*

¶ ALEXANDER JARECKI '88, April 27.\*

¶ FRED E. NORTON '91, April 19.\*

¶ JOHN A. ROONEY '91, April 6.\*

¶ CHARLES H. WESTCOTT '91, January 23.\*

¶ ALBERT L. GOETZMANN '92, April 30.

¶ ARTHUR M. BURTT '93, April 19.

¶ CHARLES D. DEMOND '93, May 7.\*

¶ FREDERICK C. SUTTER '93, February 23.\*

¶ ALBERT H. SAWYER '94, April 18.

¶ ELIZABETH F. FISHER '95, April 25. (See '96 notes.)

¶ EDWARD L. HURD '95, May 26.

¶ OSWALD C. HERING '97, March 6.\*

¶ JAMES G. MORAN '97, April 12.

¶ MICHAEL A. SULLIVAN '97, June 17, 1940.

¶ GEORGE McM. GODLEY '98, August 10.

¶ JAMES F. CLAPP '99, June 3.

¶ TIMOTHY W. HOXIE '99, May 10.

¶ JOHN W. LONG '00, February 1.\*

¶ WALTER E. RABBETH '00, October 14.

¶ ARTHUR F. BUTLER '02, May 19.

¶ ISAAC T. HADDOCK '03, May 2.\*

¶ PERCY D. LOTHROP '03, January, 1940.\*

¶ J. ALBERT C. NYPHEN '03, March 24.\*

¶ ARTHUR W. BARTLETT '04, 1940.

¶ WILLIAM E. HODGE '04, April 27.

¶ ROBERT H. DOEPKE '06, May 18.

¶ ALBERT S. KENDALL '07, May 13.\*

¶ ALBERT E. WIGGEN '07, April 18.\*

¶ HERBERT A. ANGELL '11, May 20.

¶ JOSEPH R. LUNT '14, March.

¶ HJALMAR CEDERSTROM '15, March 23.\*

¶ DANIEL J. DANKER '15, May 29.

¶ GUERNSEY A. PALMER '15, February 8.\*

¶ JAMES M. A. LANDRY '17, February 1.

¶ FRANK H. HOPKINS '18, May 11.\*

¶ JOHN P. DEAN '21, April 9.\*

¶ PAUL W. FLETCHER '21, August 15.

¶ DAVID B. JOUBERT '21, October 23.\*

¶ NATHANIEL P. WHARTON '24, May 18.\*

¶ WILLIAM R. MECHTENBERG '25, January 1.

¶ AUGUSTO C. ARINO '38, February.

¶ WILLIAM H. RIESER '39, June 2.

¶ FRANK S. CAWLEY, former staff, February 15.

# NEWS FROM THE CLUBS AND CLASSES

## CLUB NOTES

### *M.I.T. Club of Akron*

The May meeting of the Club was held on Wednesday, the twenty-eighth, at the University Club. Following a dinner and business meeting, the members heard a talk by H. C. Schuette, manager of the United States Social Security Board for this district. Mr. Schuette explained the individual and survivors' insurance benefits due to changes in the Social Security Act. — This was our last social get-together until next fall.

Robert Treat, Jr., '38, one of our young active members, was married to Janice Johnston on May 9 in Akron. — Don S. Poole '34 has been transferred from Akron to Argentina, South America, where he will be in charge of development for the Goodyear Tire and Rubber Company. — JAMES E. CONNOR '23, *Secretary*, 1746 13th Street, Cuyahoga Falls, Ohio.

### *M.I.T. Association of Cleveland*

At a meeting of the Association on May 14, Frank Long, a first lieutenant in the United States Army, spoke on "Ordnance Ammunition as Being Procured in the Cleveland Area." The meeting was held in the new quarters of the Cleveland Engineering Society at 2136 East 19th Street, Cleveland. That Lieutenant Long's timely topic held the interest of the forty-five Alumni present is indicated by the fact that discussion and questions prolonged the meeting considerably beyond the time anticipated.

The annual election of officers preceded the talk. The President, Erle F. Whitney '07, and the Vice-President, Howard P. Ferguson '27, continue in office for another year under the provisions of our constitution. New officers elected were: Frank E. Rhinehart '27, *Treasurer*; H. Arthur Zimmerman '37, *Secretary*; and H. Seymour Colton '21, Willard G. Loesch '21, Charles W. Cristal '23, Charles W. Springer '23, and William C. Sessions '26, to the executive committee. — H. ARTHUR ZIMMERMAN '37, *Secretary*, The Weatherhead Company, 300 East 131st Street, Cleveland, Ohio.

### *Technology Club of Central Pennsylvania*

The April meeting was held on the last day of the month in the rooms of the Engineers' Society at Harrisburg. Member attendance from the outlying centers, including York, Lancaster, and Lebanon, responded to the all-out call, especially since our recently adopted constitution and bylaws provided for the yearly election of officers. The occasion was particularly memorable because of the interest-

ing review of the Club's history given by our retiring President, Louis S. Morse '96. He recalled many interesting points of progress during his stewardship, expressed the deep appreciation which he has always felt in being so honored as president of the Club, and, in retiring, congratulated our new President, Frank A. Robbins, Jr., '02, on being elected. In taking office, Mr. Robbins, who is manager of the Steelton plant of the Bethlehem Steel Company, graciously accepted his new duties and thereupon proceeded to act as our presiding officer.

The other officers elected were: John P. Connelly '28 of York, *Vice-President*; Gardiner C. Wilson '15 of Lancaster, *Secretary* and *Treasurer*. A phone call announced that because of illness Pete Chunko was unfortunately unable to come. He sent his regrets. — Three hopefuls of the Class of '45 attended. Percy Tillson '06 amused the group by telling us that he, as honorary secretary for the Harrisburg district, had been asked by the Director of Admissions to report on the desirability of admitting candidate Henry T. Tillson, his own son.

Martin Radt, formerly of Germany but now a resident of Harrisburg, talked on "Nazism and the World of Tomorrow." Dr. Radt is an engineer who fled from Berlin in 1937. He told us what he feels will be the future effects of the upheaval now going on abroad. He related how closely he had watched the growth of the Nazi movement and said he felt that, since the young people have been imbued with the Nazi ideals and doctrines of hate for all other peoples, no matter who wins the present war there will always be trouble as long as the present generation lives. He expressed the hopeful belief, however, that when the democracies finally prevail, there will still remain in Germany a nucleus of people with Christian ideals around which can be restored, with our help, a democratic civilization.

At the conclusion of the talk and the discussion period that followed, President Robbins thanked Dr. Radt on behalf of the Club. The rest of the evening was spent in comparing notes on happenings since our last get-together.

The Alumni who attended were: Louis S. Morse '96, Edgar A. Weimer '98, Frank A. Robbins, Jr., '02, Clark A. Bryan '03, Percy E. Tillson '06, Carl W. Gram '09, Clifford J. Walton '14, Gardiner C. Wilson '15, Francis E. Thomas '17, Laurence O. Buckner '21, Eldor J. Mink '22, Breese J. Stevens '23, Francis A. J. Brown '26, Andrew R. Brugnoli '26, James H. Toas '30, Emil J. Neubauer '33, and Clark H. Hamilton '37. — GARDINER C. WILSON '15, *Secretary*, Armstrong Cork Company, Engineering Department, Lancaster, Pa.

### *Technology Club of Hartford*

The Club held its annual dinner at the Hartford Golf Club on Tuesday, May 20, with an attendance of about fifty. Guests were present from New Haven, Waterbury, and Bridgeport. The meeting was presided over by J. Henry L. Giles '29, President. John G. Lee '21 introduced the speaker of the evening, Odell Shepard, lieutenant governor of Connecticut, who is on sabbatical leave from Trinity College, where he is the Goodwin professor of English. He delivered a timely talk on "Connecticut Industries, Past and Present." The speech dealt with the relative values of abstract and concrete things. According to Mr. Shepard, the situation is unbalanced — too much concrete, not enough abstract.

Although — or because — Lieutenant Governor Shepard has written and published considerable poetry, he stated that professors and poets are legitimate prey for ridicule. Dictators are essentially ridiculous. He contended that the machine age will undermine civilization if we allow it to master our lives, but that does not mean that we should abolish machinery. He said we should continue to invent and produce better machinery and use the same to free us from routine and dangerous labor, thus giving us free time to be used to enrich life towards spiritual and intellectual living.

Education should be for life, not death, the speaker continued. Mr. Shepard said that if he had charge of the courses in college he would emphasize the value of the conduct or character of the student, based on his ethics, logic, and religion. It is not enough that the student be able to estimate the strength of a beam but that he know whether the beam is to be used for destructive or constructive purposes.

Physical power and comfort should lead toward immortality and the soul, the lieutenant governor went on to say. Ralph Waldo Emerson said, "Things are in the saddle and ride mankind." Shepard declared that all destructive ventures should be stopped before we are destroyed in turn. We are on the verge of catastrophic changes involving nations and lives. These changes cannot be deflected or postponed. The task has to be shouldered by engineers, professors, and all persons dealing with the intellectual and cultural problems of living.

It was put on the record that the meeting was a tribute to the memory of the late Robert E. Rogers, Professor of English at M.I.T.

The following officers were elected: President, Thomas D. Green '26; First Vice-President, Andrew S. LaPenta '22; Second Vice-President, Frederick O. A. Almquist '23; Third Vice-President, Horace B. Tuttle '21; Fourth Vice-President,



J. P. F. Pilkington '27; Fifth Vice-President, Norman J. Vile '16; Secretary-Treasurer, Louis J. Proulx, Jr., '36; and Assistant Secretary-Treasurer, John A. Swift '27. The Alumni Council Representative will be Arthur F. Peaslee '14; directors, James A. Burbank '16 and Harold W. McIntosh '19.

The following class representatives were elected: Classes to 1900, Edwin C. Alden '95; 1900 to 1910, Harold W. Griswold '08; 1910 to 1920, M. Eben Hill '15; 1920 to 1930, William S. Wise '23; 1930 to 1940, Franklin S. Atwater '38; and from 1940 on, Robert L. Millar '40.

At the same meeting the following were selected by President Giles to serve as a committee for the annual outing held on Saturday, June 28: George L. Mylchreest '10, chairman; Horace B. Tuttle, in charge of baseball; Frederick O. A. Almquist, swimming; Alexander J. Minkus '33, tennis; and William S. Wise, golf.

Those seated at the head table at the meeting were: Lieutenant Governor Shepard and Mrs. Shepard; President and Mrs. Giles; John G. Lee '21, Vice-President; Arthur F. Peaslee '14, Alumni Council Representative, and Mrs. Peaslee; and Andrew S. LaPenta '22, Secretary-Treasurer. Other members and guests were: Edwin C. Alden '95 and Mrs. Alden; Edwin P. Tripp '04 and Mrs. Tripp; George L. Mylchreest '10 and Mrs. Mylchreest; Roger W. Davis '12 and Mrs. Davis; Norman J. Vile '16; Harry H. Mardoian '18; Donald G. Merrill '18; Harold W. McIntosh '19; Alfred C. Garrigus '21; Edwin L. Rose '21 and guest, J. Russell; Horace B. Tuttle '21 and Mrs. Tuttle; Frederick O. A. Almquist '23; Thomas D. Green '26; Winslow H. Russell '26 and Mrs. Russell; Earl C. Wheeler '26 and Mrs. Wheeler; John A. Swift '27 and Mrs. Swift, with guests R. G. and Lois Perfect; Enoch F. Greene, Jr., '30; Louis Proulx, Jr., '36, and Mrs. Proulx; Franklin S. Atwater '38; Robert L. Millar '40; and Elmer G. E. Johnson. Guests from New Haven were Marshall S. Wellington '16, Samuel Jacobson '31, Albert I. Blank '37, and Charles F. Healey '37. — ANDREW S. LAPENTA '22, *Retiring Secretary*, 20 Rosedale Road, West Hartford, Conn. LOUIS J. PROULX, JR., '36, *Secretary*, 1394 Boulevard, West Hartford, Conn.

### *M.I.T. Club of East Tennessee*

The annual meeting and dinner of the Club was held at the Farragut Hotel in Knoxville on May 8 at 6:30 p.m., with Emil S. Birkenwald '23 presiding. Reports of the Secretary and Treasurer were presented and accepted.

The next order of business was the election of officers for the ensuing year. The report of the nominating committee was presented by the chairman, Robert T. Colburn '23. The results of the balloting showed the following elected: Vancouver M. Hare, Jr., '23, President; Howard P. Emerson '28, Vice-President; Bernard R. Fuller '09, Treasurer; and Arthur R. Holbrook '04, member-at-large of the executive committee. Albert S. Peet '09 was re-elected Secretary.

During the remainder of the meeting the members were entertained by George P. Palo '28, who put on a very interesting scientific quiz program. It was lucky for many of the members that they were not facing a microphone.

The fourteen members present were: Arthur R. Holbrook '04, Dana M. Wood '06, Bernard R. Fuller '09, Albert S. Peet '09, Frederick A. W. Davis '15, Erwin Harsch '20, Emil S. Birkenwald '23, Robert T. Colburn '23, Joseph C. Nowell '23, Robert E. Crawford '28, Howard P. Emerson '28, George P. Palo '28, Albert G. Kern '34, and Richard E. Hickman '36. — ALBERT S. PEET '09, *Secretary*, Knoxville Glove Company, Post Office Box 138, Knoxville, Tenn.

### *M.I.T. Club of Northern New Jersey*

May and June saw several of the Club's activities carried out to add further glamour to a year which the annual banquet in April marked as a definite success. On May 22 a regional meeting of Technology men in Elizabeth, Rahway, and the myriad of other communities where our Alumni are, south of Newark but especially in Union and Middlesex counties, was held at the Colonia Country Club in Rahway. Dinner at 7:00 p.m. started an evening of good eats and sociability for this representative group of M.I.T. men and their guests. Kebe Toabe '15 of Elizabeth was in charge of the arrangements, and the Club is indebted to him for this last fine regional meeting of the year.

Honorary Secretaries met in May to interview the applicants for scholarships. The Dean of Students, H. E. Lobdell '17, and his associate, Thomas P. Pitre, were present from the Institute, making a total of twenty for dinner.

Alumni Day in Cambridge on June 9 marked the end of our year, and the new officers, elected by the two hundred present at the banquet on April 24, took over their responsibilities. Maxwell K. Burckett '21 of Maplewood became president, and A. Raymond Brooks '17, Channing P. Clapp '23, and John M. Keck '23, vice-presidents. Newton S. Foster '28 became secretary, and Earl C. McMahon '26, treasurer. Carole A. Clarke '21 took over the responsibility for scholarship activities. Space prevents a more detailed listing of the new officers and members of the executive and advisory committees, which now total forty-two.

President Burckett called a meeting of his organization in June to discuss our general activities, especially the possibilities of further get-togethers before the regular meetings of the fall and winter. Thus the Club enters a new year under its seventh president.

We are indebted to Edson B. Snow '36 for news of the initial get-together of the Technology men at Fort Monmouth in April: "We had a turnout of fifteen fellows, of which about ten were officers and the rest civil service men at the signal corps laboratory. Major Pigg, formerly of the Institute staff, was our honored guest and probably the best purveyor of en-

thusiasm at the meeting. I believe we shall have a larger group when we get more extensive advertising for the next meeting.

"As usual the one who starts something has it bounce back at him, so I [Snow] am the president of the 'M.I.T. Alumni Association of Fort Monmouth.' B. Allan Monderer '39 is the secretary-treasurer, and Roman I. Ulans '36 is in charge of programs. Major Pigg was elected honorary chairman and sergeant at arms. We intend to meet once a month and have social and informational meetings. With Major Pigg's help we hope to have some of the important men of the post explain a few things to us. We also intend, as a group, to organize something for the thirty-odd Technology boys who will be here with the Reserve Officers' Training Corps this summer." — NEWTON S. FOSTER '28, *Secretary*, 73 Daniel Avenue, Rutherford, N.J. *Assistant Secretaries*: ROBERT F. WAY '33 and WALTER L. WISE, JR., '34, Colgate-Palmolive-Peet Company, 105 Hudson Street, Jersey City, N.J.

### *M.I.T. Club of Western Pennsylvania*

Elbridge J. Casselman '15 presided at the April 29 dinner meeting of the Club. Dinner was served in a private dining room of Stouffer's Restaurant in downtown Pittsburgh. Various reels of sound movies showing the mining of bauxite, the refining of the ore, the production of metallic aluminum, and the fabrication of the finished product were presented. No formal speeches were made, but a lively informal discussion concerning aluminum was held. Ralph M. Ferry '12, general superintendent of the New Kensington works; Herbert H. Hall '14, mechanical engineer; Theodore W. Bosart '20, assistant chief metallurgist of the fabricating division; F. Reed Dallye '22, sales engineer; and Martin L. Tressel '24, assistant to the general superintendent of the reduction division — all of the Aluminum Company of America — had their hands full in answering some of the questions raised, particularly some of the questions that the steel and copper men asked. After the discussion, members formed smaller groups and settled down to the business of drinking beer while playing cards or holding informal bull sessions.

On May 27 the Club had dinner at the University Club in Pittsburgh. Immediately following the dinner the annual business meeting for the nomination and election of officers was held. Through the courtesy of Robert A. Miller '16 a recently released series of movies depicting another of Pittsburgh's industries was shown. The films were entitled *The Manufacture of Plate Glass* and *The Manufacture of Safety Glass*.

As a result of a suggestion by Norman C. Hill '26, the first edition of the Club's newssheet, *The Filter Paper — Only the Pure Gets Through*, was issued in April. The paper contains news of the doings of club members, a summary of the pre-

ceding club meeting, personal notes, and the names and addresses of members who have either just entered the club district or just left. The paper has obtained a wide popularity among club members. — F. REED DALLYE '22, *Secretary*, Aluminum Company of America, 801 Gulf Building, Pittsburgh, Pa. PAUL R. DES JARDINS '38, *Assistant Secretary*, 1945 Koppers Building, Pittsburgh, Pa.

### *M.I.T. Club of Western Maine*

On Wednesday evening, May 14, twenty-four Alumni and guests sat down to a dinner in the Eastland Hotel in Portland. In the absence of our President, S. Lindsay Lord '28, who has transferred to Washington, Lewis D. Nisbet '09 presided. Elmer W. Campbell '21, director of the division of sanitary engineering, State Department of Health, Augusta, was elected president, and your Secretary was re-elected.

Members decided to hold a meeting later on in the summer, and President Campbell appointed the following committees to take charge of this event: *Meeting*, Philip H. Rhodes '35, chairman, Lewis D. Nisbet '09, and Alfred E. B. Hall '15; *Entertainment*, H. Stanley Weymouth '19, chairman, Donald O. Hooper '15, and Ronald J. Martin '26.

Following the business meeting Mr. Nisbet introduced the speaker of the evening, George M. Carter, Adjutant General of the state of Maine. General Carter spoke on "Defense in Maine," and the following account has been condensed from the newspaper account of the meeting: The Army Intelligence Service and the Federal Bureau of Investigation have been checking fifth-column and sabotage possibilities not only along the coast but all over the state. Proof that the Federal Government and the War Department are interested in the adequate defense of this corner of the nation is seen in the fact that Federal aid for airport construction here totals \$7,000,000 or \$8,000,000, by far the largest single program in any state in the union. Although it can furnish no equipment, the state is doing everything it can to encourage organization of voluntary local defense units. The state can commission extra home-guard officers to train such groups, for in every locality there are water supplies, power stations, bridges, and other strategic points which such groups can aid in protecting.

The Secretary received a letter from Henry O. Trowbridge '02, chief engineer of the Bath Iron Works, too late to be read at the meeting. A portion of the letter follows: "I can speak for several local Technology men, as I know that defense work here is requiring their entire attention. I refer particularly to Arthur B. Stearns '90, William S. Newell '99, Edward E. Pierce '99, George B. Connard '25, Selwyn H. Towne, Jr., '29, John R. Newell '34, Arthur L. Haskins '35, and John J. Perkins '38. We have so much work here at the iron works that it is almost out of the question to attempt to attend meetings even as short a distance away as Portland."

By a curious twist of circumstances, two of the most prominent Technology men in Maine were in the Eastland Hotel that same night attending a dinner for the Clover Farm and Red and White stores. James E. Barlow '05, city manager of Portland, was the toastmaster, and William S. Newell, President of the Bath Iron Works, was the principal speaker. — ALFRED E. B. HALL '15, *Secretary*, 19 Locke Street, Saco, Maine.

### *Technology Club of Shanghai*

The Club is still holding monthly meetings, with an average attendance of about fifty members. In fact the Technology Club is the only alumni club that is still holding regular meetings under the present situation. Recently we made a financial drive for the club entertainment fund and obtained \$4,000 instead of the original \$3,000 that we had in mind. Surely that shows the Tech spirit!

The China Institute of Industrial Training, which we sponsor, occupies much of our attention. The machine shop has already been put into operation; the electrical laboratory is ready; and the automobile course is co-operating with local firms so that we can make use of some of their equipment. In this way we are not overburdened financially at the beginning. — TSU-KANG HSUEH '24, *Secretary*, care of Walter Kwok, Room 420, 406 Kiangse Road, National Commercial Bank Building, Shanghai, China. JI-DAN WOO '38, *Assistant Secretary*, same address.

### *Washington Society of the M.I.T.*

The May meeting of the Society, held at the Y.W.C.A. on the sixteenth, was attended by an unanticipated number of members. Usually, interest slackens for the summer season after the annual ladies' night dinner, but sixty members and guests were at this meeting. — It was possible, however, to provide accommodations for all to listen to the talk, and all but eight were taken care of at the dinner. The subject, an off-the-record talk on a recent trip to London, undoubtedly produced the unusually large attendance for this season. Merton Emerson '04 presided in his usual capable, genial manner.

The nominating committee, consisting of Proctor L. Dougherty '97, Edward D. Merrill '09, and Henry D. Randall, Jr., '31, recommended the following: President, Merton L. Emerson '04; Vice-President and Review Secretary, William K. MacMahon '22; Executive Secretary, Amasa M. Holcombe '04; Treasurer, G. Donald Fife '24; and Executive Committee, Albert F. Bird '30 and Oliver G. Green '30. No further nominations were received from the floor, and the Secretary was instructed to cast the unanimous vote for the new officers. This election at the May meeting marked an improvement in procedure. In former years the election had taken place in a more or less haphazard fashion at the annual picnic.

Henry D. Randall, Jr., an Honorary Secretary, introduced to the gathering William Bruce Gist, who was nominated by the scholarship committee of the

Society for the regional alumni scholarship. Bill MacMahon reviewed briefly the meetings held during the past year, listing the outstanding speakers that we had been fortunate to obtain and giving a very brief summary of the subjects discussed. The total attendance for the current year, through the April meeting, was 485, an increase of one hundred over the year before. Many newcomers attended our monthly meetings and ladies' night. Although we cannot claim regular attendance, the meetings during the past year have interested a wider circle of Technology men.

The annual picnic was held on Saturday, June 21, on the estate of Allen B. McDaniel '01 at Waterford, near Leesburg, Va. John D. Fitch '24 was the chairman in charge of this outing.

The speaker at our May meeting, Geoffrey May, associate director and deputy defense co-ordinator of the Federal Security Agency, gave a most interesting off-the-record talk on his recent trip to London, discussing details of the blackout, the points in which it was somewhat ineffective, the relative number of casualties in and out of group shelters, traffic conditions, morale, and many other interesting phases based on his personal observations. Taking Dr. May at his word, the Secretary has considered the entire talk off the record. Those privileged to attend the meeting were most fortunate in hearing an interesting, informal, and friendly portrayal of conditions in England today.

The following M.I.T. men and guests enjoyed the talk and the dinner: Granville H. Parks '87, George W. Stone '89, John G. Crane '90, George W. Stose '93, Charles G. Abbot '94, George E. Stratton '96, Proctor L. Dougherty '97, Frederick A. Hunnewell '97, Charles Bittinger '01, W. Lorrain Cook '03, Merton L. Emerson '04, Amasa M. Holcombe '04, Frank W. Milliken '04, George H. Shaw '04, George N. Wheat '04, Ben E. Lindsly '05, Maurice E. Weaver '05, George A. Robinson '12, Alfred E. Hanson '14, Aubrey D. Beidelman '15, Horace M. Baxter '17, Louis J. Grayson '19, John Nolen, Jr., '20, Wendell P. Sammet '20, Lawrence W. Conant '21, Kenneth Bernard '22, Rudolf H. Blatter '22, William K. MacMahon '22, Paul J. Culhane '23, William V. Cash '24, G. Donald Fife '24, John D. Fitch '24, R. Paul Schreiber '24, Edward M. Lee '25, Theodore L. Soo-Hoo '26, Mary O. Soroka '26, Donald F. Horton '27, Charles C. Smith '27, Roland L. Hutchings '28, M. Waldo Keyes '28, John A. Plugge '29, Alfred F. Bird '30, Oliver G. Green '30, John A. Mathews '30, Charles E. Loucks '31, Raymond S. Poor '31, Henry D. Randall, Jr., '31, Frederick M. Moss '32, John A. Robertson '32, Roger J. Zampell '32, Charles B. Bryan '33, M. Elsa Gardner '33, George E. Wuestefeld '34, George B. Hunter, Jr., '37, Blake M. Loring '37, George B. Wemple '37, and William H. Deering '39. The guests were William B. Gist, Samuel Pillsbury, and Campbell H. Plugge. — AMASA M. HOLCOMBE '04, *Secretary*, 4817 Woodway Lane, Northwest, Washington, D.C. WILLIAM K. MAC-



MAHON '22, *Review Secretary*, Rosslyn Gas Company, 3240 Wilson Boulevard, Arlington, Va.

### M.I.T. Women's Association

The Association held one of its liveliest, most amusing, and profitable meetings on April 23 in the Emma Rogers Room at the Institute. After the excellent supper (thanks to Amelia Brooks Valtz '37, IV) the white-elephant auction took place. Frances G. Emery '39, IV, our Corresponding Secretary, resplendent in frock coat, trousers, and moustache, acted with verve and wit as auctioneer and disposed of all breeds of white elephants, much to everyone's enjoyment. Several members who could not attend sent elephants; others sent checks. With this co-operation from the absent members and with Fran's histrionics, the Association netted about forty dollars for student aid.

Counting members and guests, about forty were present. Other Alumnae were: Dr. Alice G. Bryant '86, Agnes Fraser Boursaud '98, S. Maria Elliott '98, Susan Mara Maguire '01, Marie C. Turner '09, June Adkinson '11, Charlotte Simonds Sage '13, Louise Pierce Horwood '19, Marjorie Pierce '22, Ruth Andrew Dean '29, Mary Magdalen Handrahan '31, Theodora Keith '32, Evelyn Killam Hoar '34, Anna Cheskis Kling '34, Kathleen V. Shott '36, Polly Povey Thompson '37, R. Gretchen VanStratum Nelson '38, Esther B. Garber '39, Helen R. Bunker '40, and Mary C. Jones.

This was the fourth Cambridge alumnae meeting this year. The first was held on Sunday, November 17, to welcome twenty-seven new members, seventeen of whom were present. The total attendance at the meeting was fifty-four. — At the second gathering on Thursday, December 12, fifty-six Alumnae honored the memory of Ellen S. Richards '73, the first Technology woman student. — At the fourth meeting, on February 18, Edward R. Schwarz '23, Professor of Textile Technology, spoke on textiles and showed slides and exhibited fabrics and yarns used in the manufacture of textiles through the ages.

A New York regional meeting was held at the Town Hall Club on Saturday, May 17, with Elisabeth Coit '19 as chairman. We thank her for arranging the luncheon at her club and for caring for the many details which made the gathering so pleasant. (This was the second regional meeting, the first being held in Providence, R.I., on Saturday, March 22.) Marjory Pierce '22, IV, President, Myra L. Davis '03, executive board member, and Polly Povey Thompson '38, IV, Recording Secretary, attended.

Miss Pierce told of the activities of the undergraduates' organization, now called Association of Women Students instead of Cleofan, and of our own Association. As at Providence, an explanation was made that our increase in membership this year, especially of women active in professional and technical fields, is a result of the supper meetings, regional meetings, newsletters, and our unit knitting for the British War Relief.

Marcella O'Grady Boveri '85, IX, came from New Haven and stole the show with her brief biography. She took Professor William T. Sedgwick's course in biology and then pioneered at Bryn Mawr. Before getting her Ph.D., she was one of the first biologists at Vassar and also went to Naples to study marine biology. After she received her degree, one of her Naples professors came here and married her. They went to Germany to study under the famous scientists who were gathered there. Her husband died in 1915. During the war she had charge of a hospital in Germany, but returned immediately after the war to teach biology. Mrs. Boveri received an ovation from the gathering before she left for another meeting.

Evelyn B. Hewett '31 received her degree from Radcliffe. Miss Hewett has her poems published under the name of Evelyn Hewitt. Henry David Gray, a professor of Stanford University, has been her critic since 1937.

After graduation Frances Bliven Whedon '24, VIII, went to the laboratory at Langley Field where she worked on atmospheric conditions of the wind tunnel. Later, because of her only child, a girl, she became connected with the science department of the Staten Island Academy. Now she is assistant head of the science department.

Eleanor G. Pepper '28, IV, went to Paris for four years following her graduation. She attended the Sorbonne in the morning and worked in an architect's office in the afternoon. Then she was with *House and Garden* for a year. She spent a year at Stephens Junior College, Columbia, Mo., establishing an architectural appreciation course, and three years ago opened her own office in New York City. She designed the Terrace Club for the New York World's Fair.

Mary Watson Tripp '25, IX-A, is a mechanical draftsman in defense work at Westinghouse Electric Elevator Company in Jersey City. She has two daughters, one sixteen, the other five.

Roberta Lovely Halligan '28, VII, has been bacteriologist at the Montclair, N.J., Department of Health since graduation. She has been married since a year ago last September, and is one of our enthusiastic knitters.

Ida Brown Webster '23, IV, has practiced architecture for fourteen years with the exception of one year in Europe. She is a partner in the architectural firm of Evans, Moore and Woodbridge, New York City. She has two children.

Anne I. Schivek '38, V, worked for a rubber company for a while after graduation, then went to Harvard College to work in biochemistry. Now she is a chemist at Lederle Laboratories, Inc., a pharmaceutical and biological house at Pearl River, N.Y. She lives at 76 North Main Street.

Elsa Habicht Mueser '16, V, had her pick of chemistry jobs when she left the Institute. Women chemists were much in demand, and therefore they could select what they wished. Now Mrs. Mueser's three children, two of whom are in college, occupy her full time.

Ruth E. Densford '25, IX-C, went from Technology to Yale for an advanced degree. Since 1927 she has taught mathematics in Snyder High School in Jersey City, N.J.

Elisabeth Coit is a practicing architect in New York City. She was first associated with the office of Grosvenor Atterbury in New York, where she worked mornings and devoted afternoons to building her own practice. Two years ago the American Institute of Architects, of which she is a member, gave her an Edward Langley scholarship for one year's research, for which she studied small houses for the very low income group. This scholarship was renewed, so that she has spent two years commuting among Wisconsin, Tennessee, and Boston. Miss Coit also writes book reviews for the *Architectural Record*.

Elizabeth S. Avery '40, VII, has been teaching at Edward Park, Briarcliffe, N.Y., since her graduation.

Gretchen A. Palmer '18, IX-A, finished school in a hurry, her last five exams being given to her in two hours because of the war job waiting for her in Pittsburgh. Later she did social service and church work and would have become a missionary except for her family. Instead, she went into her father's office as business associate. Now she is executive and financial secretary of The Thomas School, Rowayton, Conn. Miss Palmer is a past president of the Association.

Harriet Gallup deLancey '94, V, had to cancel her reservation but asked that her check be used for flowers. They were beautiful and served as a pleasant reminder of her desire to be present.

Can anyone give information about Rosemary Norris Kutak '27, IX-C, and Hilda Young '27, IV? Or other Alumnae?

Elizabeth Gregory MacGill '34, XVI, was featured in the New York *Herald Tribune's* magazine section of May 4. She is chief engineer of one of the biggest warplane plants in all the British Empire, turning out one hundred Hurricanes a month at Fort William, Ontario, Canada. — POLLY POVEY THOMPSON '37, *Secretary*, 204 Holden Green, Cambridge, Mass.

## CLASS NOTES

1881

George L. Norris '87 sent us a clipping about the death of our classmate Webster Norris. The notice appeared in the *India Rubber World* of May 1: "Webster Norris, who retired in 1937 as technical editor of INDIA RUBBER WORLD, died of a heart attack at his home in Hempstead, L.I., N.Y., on April 20, only two days after he had returned with his wife from a winter spent in Florida.

"Mr. Norris, who was in his eighty-first year, was born in Charlestown, Mass., now a part of Boston, and after attending the grammar and high schools of that city attended the Massachusetts Institute of Technology. . . . His first work was as an analyst in steel and sugar refining industries, and a few years after



1881 Continued

his graduation he was chief chemist of the Chicago, Milwaukee & St. Paul Railway Co.

"Mr. Norris soon saw, however, the need of chemical standardization of the materials, processes, and products of rubber manufacture. As a result, in 1887 he became chemist of the Boston Rubber Shoe Co. at the laboratory of its Malden plant, later becoming superintendent of the company's Plant No. 1. He was regarded as being one of the first, if not the first, of the early chemists to be employed regularly by an American rubber manufacturing company.

"He remained with the Boston Rubber Shoe Co. eight years, and in 1895 became chemist for the Revere Rubber Co. Subsequently he served as superintendent with several important companies, among them the Gutta Percha & Rubber Mfg. Co., New York; The Canadian Rubber Co., Ltd., Montreal; the Republic Rubber Co., Youngstown, O.; and the New York Rubber Co., New York. He also lectured on the technology of rubber at M.I.T. and was granted several patents on rubber-working machinery and factory equipment, including a special loop for rubber boots, a roll for rubber mixing mills and a micrometer dial gage.

"Mr. Norris was among the first regular contributors to *INDIA RUBBER WORLD*, starting to write for the paper soon after it was founded in 1889. He continued his contributions until 1917 when he became a member of the regular staff in charge of the chemical department, a position he retained until retirement. From 1917 he also conducted a private practice as consulting rubber technologist. Mr. Norris . . . is survived by his wife and two brothers. . . ." — FRANK E. CAME, *Secretary*, Chambly Canton, Quebec, Canada.

## 1887

For '87's notes, see page xxiv.

## 1888

Last March, Herbert Bird had two fiftieth anniversary celebrations. He was presented with a gold medal, a gold watch, and luncheons by his company, Standard Brands, Inc. He tells about the parties as follows: " . . . It so happened that there were three of us having our fiftieth anniversary within a month. . . . Because of the unusual occurrence of three anniversaries so near together, the company made quite a time of it, giving the employees a half holiday and having a fine luncheon for some 250 of us.

"On the actual date of my anniversary my control laboratory and the research laboratory had planned a party for me, but I was so ill I couldn't get there. They put it off for two days and then came for me and took me home again. The room was beautifully decked in green and gold (St. Patrick's day), with yellow roses and 50's; a fine lunch was served. . . . My laboratory associates gave me a traveling case. . . .

"I celebrated my seventy-fifth birthday on April 28, so now all the big celebrations are over for me, unless there be the fifty-fifth for '88."

Fred Nichols and his wife left their winter home at 107 Robinson Avenue, Orlando, Fla., on May 12, bound for Chicago via car to Jacksonville, boat to Baltimore, and car over the new Pennsylvania Turnpike to Columbiana, Ohio, where Fred golfed for a month.

On April 27 we lost another of our big-business classmates, Alexander H. Jarecki of Erie, Pa. We quote from the *Erie Times* of April 28: "Alexander H. Jarecki, Erie's most prominent industrial leader, president of the Jarecki manufacturing company and vice-president of the Continental Rubber Works, died in his home at 305 W. 6th St. . . . Seventy-five years of age, the deceased passed away . . . after less than a month's illness. . . .

"Mr. Jarecki died less than four weeks after the death of his son, Carl A. Jarecki, former treasurer and assistant secretary of the company. . . . Immediately after his son's death, the elder Jarecki returned home from Florida where he had been spending the winter with his wife and close relatives. It was shortly after his return here that the illness developed which led to the end.

"Mr. Jarecki was born in Erie on April 19, 1866. . . . The deceased was educated at Erie Academy and later attended the Massachusetts Institute of Technology at Boston, Mass., where he studied mechanical engineering. . . .

"Prominent in community social and civic activity, the deceased probably held more important honorary and active positions and memberships than any other Erie resident. He was vice-president and director of the former Lakeside Forge company, director of the now defunct Second National bank, vice-president and director of the Continental Rubber Works, director of the H. F. Watson company, former treasurer and a member of the board of managers of Hamot hospital, former member of the board of managers of the Community Chest of Erie, director and member of the executive committee of the former North Western Electric Service company.

"Others included a membership of the American Society of Mechanical Engineers, the American Society of Testing Materials, the National Foundrymen's Association, presidency of the Pipe Fittings and Valve Exchange, and a membership in the executive committee of the National Founders Association. The late manufacturer was also honored by memberships in the American Iron and Steel Institute, the Engineers Club of New York, the Erie club, the Erie Yacht club, the University club, Erie Kahkwa club, and the Technology club of New York. Many other local organizations also claimed him as an honorary or active member.

"During the World war, the late company president served on the War Service committee and on the Erie County Council of National Defense. His work on those two bodies proved extremely valuable to the war service of our country. His company was engaged in war work to a major extent for the United States government during the first World war.

"Besides his one daughter and wife there are also two grandchildren surviving, Louise and Carla Jarecki, and one brother, Robert Jarecki. . . ."

An editorial in the same issue of the *Erie Times* says the following about Jarecki: "Possessed of personal charm and a deep and sincere understanding of his fellow beings, he was considered an outstanding advisor in matters of both business and life. Broadly educated, he spread his wisdom as well as his benevolence generously. It is with heavy heart today that we record the passing of an outstanding citizen, a gentleman, a kind parent and a leader of men."

Sanford Thompson, our Assistant Secretary, writes from Washington as follows: "I've just returned from a short trip to Wright Field in Dayton. I may be here for 'the duration,' as there is a lot to be done.

"Most important news is that I played my first game of golf — eighteen holes — this morning. . . . The office of the under secretary of war, to which I am attached as consultant, acts in a supervisory capacity over the various supply, arms, and service branches, which include ordnance, air corps, quartermaster, signal corps, and others having to do with the making of munitions and the building of new plants. I am busy on a variety of matters involving organization and personnel and the expediting of production in the various branches, and in connection with some of the officials of the office of production management. Contrary to many comments one hears, the Army and Navy are doing a fine job in producing defense materials. The main trouble is that one cannot build new factories or new machine tools in a minute or in a month. When we think of the stupendous business created in a few months and the great organization that had to be created to handle it — thousands of men and women — the achievements are great, although the time has been far too short to deliver all that is needed for Britain."

— BERTRAND R. T. COLLINS, *Secretary*, Chebeague Island, Maine. SANFORD E. THOMPSON, *Assistant Secretary*, Thompson and Lichtner Company, Inc., 620 Newbury Street, Boston, Mass.

## 1889

William W. Lewis had a fine visit for about two months this winter in Arizona and the interesting spots in the Southwest, including some of the copper mines and great dams in that locality. — Frank Hobbs's golden jubilee in the employ of the Arlington Mills was observed on January 27 by a banquet tendered him by the Overseers' and Second Hands' Association. Frank was presented with a morocco book, which bore the signatures of the 6,214 employees of the mill, and a fifty-year pin in recognition of his half-century of service with the organization.

The *New York Times* of February 12 had the following article about Hobart: "Henry M. Hobart has resigned as consulting engineer with the General Electric Company. . . . Mr. Hobart, who had been actively engaged in the industry

for more than fifty years, reached retirement age in 1938, but since then has continued in a part-time consulting capacity. A graduate of Massachusetts Institute of Technology, he joined the testing department of the Thomson-Houston Electric Company, Lynn, Mass., in 1889. Soon after, he was transferred here [Schenectady], where he worked in the office of Dr. Charles P. Steinmetz. In 1900 he became associated with the British Thomson-Houston Company in London. Later he was with the Union Elektricitäts Gesellschaft in Berlin. Mr. Hobart returned to the General Electric Company in 1911 as consulting engineer, a position he held until his retirement. For many years he served as chairman of the fundamental research division of the Engineering Foundation's welding committee. He is the author and co-author of numerous technical books and is the holder of a large number of patents." — WALTER H. KILHAM, *Secretary*, 126 Newbury Street, Boston, Mass.

## 1891

At the time I am writing these notes, our jubilee is only two weeks away, and it will all be over long before you read this. We propose to get out a class book, fully illustrated, which will tell you all about it. Many letters have been received about our reunion, and some of these will be printed later.

John A. Rooney died on April 6. In response to a notice sent out for our fiftieth, he had replied that he did not know whether he could come: "It is as the doctor says." As far as we know, he held the class record for grandchildren — thirteen. The following is from the *Boston Herald*: "John A. Rooney, 75, former Boston building commissioner, died . . . at his home, 100 Grayfield avenue, West Roxbury. . . . Born December 8, 1865, he was graduated from Massachusetts Institute of Technology. . . . He was a director of the Master Builders' Association, president of Eastern Quarries, president of the Pilgrim Granite Corp., and vice-president of the Eire Society.

"Mr. Rooney leaves two daughters, Mrs. Edgar J. Driscoll of West Roxbury and Mrs. Thomas F. McSweeney of Hingham; a son, John H. Rooney of Dedham, and thirteen grandchildren. . . ."

Fred E. Norton died on April 19 at Youngstown, Ohio. We had not heard from him for some time. Willard H. Roots, who is on our class list but who affiliates with '90, writes as follows from Mansfield, Mass.: "Here is a clipping I have received from Mrs. Fred Elmer Norton. I visited Fred (my cousin) in Youngstown, Ohio, last fall. We were brought up as brothers, and my own brother, Logan Herbert Roots, was graduated from Harvard in '91. Then we 'exploded.' Fred went to South Africa, my brother to China as bishop of Hankow, and I went as a circuit rider to the state of Washington. So we have not seen much of each other since graduation, and I will not attempt to add to the clipping."

The following is from the newspaper clipping mentioned above: "Fred E. Nor-

ton, aged 71, of 2314 Elm street, internationally known designing engineer, and special engineer for Youngstown Sheet & Tube Co. for 13 years, died of a heart attack. . . .

"Mr. Norton, as a 'dollar-a-year man' for the government during the World War, designed the first equipment for producing helium in large quantities. Earlier he designed steampiping used for the first World's Fair in Chicago in 1893, and designed the first gas engines for the William Tod Co. here, when he was chief designing and developing engineer for blowing and gas engines for that company. Another phase of his designing work was that of designing steam turbines for General Electric Co. at Lynn, Mass. Mr. Norton's engineering career took him to Europe, Asia and South Africa. After graduation from Massachusetts Institute of Technology . . . he joined Allis-Chalmers Co. as engineer in charge of mining equipment for diamond mines in the Union of South Africa. While he was in South Africa, for nine years, Mr. Norton had charge of construction of a plant at Kimberley Diamond Mines.

"During the Boer War, Mr. Norton was captured by the Boers and was given the job of carrying their wounded from the field. Through venturing farther and farther from Boer camps, Mr. Norton was able to get over to the British side and to Johannesburg, where he informed British generals of the position of the Boers, and to assist in turning the tide of the war.

"For General Electric Co., Mr. Norton traveled extensively through Europe and Asia, gaining a world-wide reputation as a power engineer. Later he came here with William Tod Co., leaving to serve the government during the World War. Mr. Norton came to the Youngstown Sheet & Tube Co. in 1928 following several years' retirement after the war.

"Born in Du Quoin, Ill., Sept. 2, 1869, he was a son of S. V. and Helen Blakeslee Norton. He was a member of the First Presbyterian Church here. Mr. Norton leaves his wife, Lida Brinton Norton."

We have been informed through the Alumni Office of the death on January 23 of Charles H. Westcott of Malden, Mass. He was supervisor of manual training at the Malden High School and was interested in tree planting.

The following changes in address have been received: Harmon Wendell, 4257 Clybourn Avenue, North Hollywood, Calif.; Charles Garrison, 501 East Pedregosa Street, Santa Barbara, Calif.; Edward R. Wait, Pigeon Cove, Rockport, Mass. — HENRY A. FISKE, *Secretary*, Grinnell Company, Inc., 260 West Exchange Street, Providence, R.I. BARNARD CAPEN, *Assistant Secretary*, 364 Union Avenue, Framingham, Mass.

## 1893

Rigby Wason and his family, according to last accounts, have not been harmed by the intensive bombardment of England. Fortunately, they are living in what apparently is a district little likely to be attacked — the Isle of Wight.

Rigby would doubtless welcome letters from his classmates on this side of the Atlantic. His address is: "Highfield," Torland Bay, Isle of Wight, England. John I. Solomon of New York, who keeps in touch with him, contributes to this column two items of especial interest: The first, a letter from Rigby, was published in the *New York Times* in April. The other, a personal letter written in February, tells of Rigby's location and activities. Here is the *Times* letter: "I hope the following story, which I cull from the columns of the *Ayrshire Post*, may grip some of your readers: 'After the Blitz which took place on Clydeside during the early days of this month, a civil-defense worker met a little boy clad only in his shirt, carrying on his back his still smaller sister, also dressed for sleeping indoors. "Hey, Mister, can you help me wi' ma wee sister?" was his appeal, followed immediately by the assurance to cover the trembling of his limbs, "And mind ye, I'm cauld, no feart," which being translated into ordinary English means: "I'm cold, not frightened."

"That wee Glasgow laddie spoke for us all when he said he was 'no feart,' and may I add, nor are we 'cauld,' our hearts being aglow with the magnificent backing we are getting in such good measure — pressed down and shaken — from all the people of your own great country. . . ."

Extracts from Rigby's February 20 letter to Solomon, which follow, tell between the lines something of the spirit which is England's today: "I was mighty glad to hear from you and of you, for the number of my old friends in your country is a steadily diminishing quantity — as is only natural. Only yesterday I had news of the death of another. . . . But I often think of you all, for I have much time to while away, being a member of our local observer corps. Observing is mighty cold and mighty dull work, but useful enough and interesting too, when there's much doing. Our chief job is to report and plot all airplanes, though other duties come our way at times. I work four hours a day at it; and as the post is some two miles away, which I usually have to foot, I get about six hours in the open and am now bronzed with the ruddy tan 'God's air doth give a man.' I'm lucky, too, for we are a mixed lot in our little group — a colonel, several majors, bank clerks, shopkeepers, an ex-postman, a chauffeur, and so on. More than half of them cannot do a duty between 8:00 A.M. and 8:00 P.M., so I get more than my share of the daylight hours. We've the manager and the electrician of our local cinema, and they — God bless them — rather like 12:00 midnight to 4:00 A.M., for they finish about 11:00 P.M., have a meal, and then report. The shopkeepers volunteer for 4:00 A.M. to 8:00 A.M., as when they get off they go straight to work, and so on. Some of our lot are very good at the job; but for the life of me I cannot tell some of the planes apart when they are far away, or very high up.



1893 Continued

"We've made ourselves quite a good enclosure, sandbagged and with a dug-out; and though we've had a German over occasionally — photoing, I take it, the Solent with Portsmouth and Southampton — I don't think we are in much danger, for it would be a mighty bad shot and a waste of a good bomb to drop one here. We are only some two miles from the Needles at the extreme west of the island. So here we are, and here we remain 'for the duration.' This is the wife's old home, bought when I sold Blair. Highfield is a charming little place with a tennis court, a good garden — quite a show one — and a grand view over the Solent; and by going to the bottom of the garden we are almost on the beach for bathing. We are just suffering our first 'hardship' — shortage of fuel — but I'm writing this in my library with a Valor oilstove on, and after tea we shall have a fire. I'm lucky, for I've got some logs from trees felled a few years back. No shortage of anything else.

"My eldest is at Rugby Schoolhouse, where I was for over five years. (Have you ever read *Tom Brown's School-Days*?) The other son is at boarding school. So all's well with me, and I count my blessings. My sister Minna is in Aberdeenshire, and Brenda stays with us off and on here as a refugee from town. Both my brothers are at their home in Somersetshire. . . .

"I miss London, of course, with my clubs and societies, for I'm a Cockney at heart; but I'm hoping to see Piccadilly Circus again some day — and undamaged. I guess you are, too. I never see a cultured pearl — and the shops are full of them — without thinking of you and that rascal Mikimoto. . . ."

Frederick Charles Sutter, VI, one of our well-known members, died at Cottage Hospital, Grosse Pointe, Mich., on Sunday, February 23. Following his graduation, Sutter spent five years in the shops of the Westinghouse Electric and Manufacturing Company. In 1898 he organized in Pittsburgh his own electrical manufacturing company, called the Pittsburgh Transformer Company. In 1910 he retired from active business and returned to his native city, Detroit, where he was born in 1870. Thereafter he made his home first at 2981 West Grand Boulevard, Detroit, and later at 1000 Kensington Road, Grosse Pointe Park, Mich.

For a number of years he was a member of the Grosse Pointe School Board and at one time was its president. During World War I, he was supervisor of production, representing the ordnance department, United States Army, at various factories in Detroit.

Sutter was well known in amateur radio circles. Five years ago he was granted a license for an amateur station and was reputedly the oldest amateur to receive a license. He operated stations at his home and at his summer cottage at the St. Clair Flats. He designed radio rigs and wrote articles for amateur radio magazines. He was a member of the Detroit Boat Club and president of the Prismatic Club.

Sutter married, in 1894, Emily Ward Mayhew. He leaves three sons and a sister.

Charles Denny Demond, a native of Boston and one of the few members of the Class to be graduated in Mining Engineering, died on May 7 at the age of seventy-one years. For the past ten years or more he had been living at 320 South Buena Vista Street, Redlands, Calif.

Following his graduation, Demond worked for a time as a sampler and assistant chemist in the concentrator and assay office of the Boston and Montana Consolidated Copper and Silver Mining Company at Great Falls, Mont. He then returned to the Institute, where for five years he was private assistant to Robert H. Richards '68 in experimental work connected with the preparation of the latter's monumental work on ore dressing. Returning to Montana in 1902, Demond joined the Anaconda Copper Mining Company as assistant testing engineer and from 1903 to 1921 was testing engineer of that company, engaged in investigating various problems in ore dressing, metallurgy, construction, and mechanical engineering. Thereafter for about three years he was engaged in private practice as consulting metallurgical engineer in Anaconda, Mont. In 1924 he went to Colton, Calif., where for the next six years he was assistant chemical engineer of the California Portland Cement Company.

Throughout his career Demond contributed to the literature of his profession. He prepared a chapter on metallurgy for Thorp's *Outlines of Industrial Chemistry*. His "Some Experiments for Determining the Refractoriness of Fire-Clays" (with H. O. Hofman), his "Economy and Efficiency in Reverberatory Smelting," three technical descriptions of the Anaconda Reduction Works, and other contributions are to be found in the *Transactions* of the American Institute of Mining and Metallurgical Engineers, of which society he had long been a member and had served as a director of its Montana section. He was a contributor, also, to the technical press. An active and loyal alumnus, he was formerly secretary of the Montana Society of the M.I.T. In 1896, Demond married Margaret P. Bixby of Great Falls, Mont., and they had two daughters, Edith Gilchrist and Martha Bixby Demond.

The following changes of address have been received: William W. Carter, 1465 Northeast 110th Street, Miami, Fla.; Archibald Murray, Post Office Box 34, Wolfville, Nova Scotia; and Cadwallader Washburn, Lakewood, N.J. — FREDERIC H. FAY, *Secretary*, 11 Beacon Street, Boston, Mass. GEORGE B. GLIDDEN, *Assistant Secretary*, 551 Tremont Street, Boston, Mass.

## 1896

These notes are being dictated the last of May, but by the time they appear in print in the July issue, the class reunion, celebrating our forty-fifth anniversary, and Alumni Day will be matters of the past. It will not be possible to give a

detailed report of our celebration until the first issue of The Review in the fall. The material available at this time is gleaned mainly from replies received to the questionnaires on reunion and Alumni Day.

R. E. Bakenhus saw Charlie Hyde at the spring meeting of the American Society of Civil Engineers in Baltimore during the week of April 20. Charlie is a member of the board of directors of that organization. While Bakenhus was attending the Baltimore meeting he met with the executive committee of the waterways division, of which he is a member. He is also general chairman of the committee on bearing value of pile foundations, which is doing some basic work on piles in the light of the latest developments in the new science of soil mechanics.

Dan Bates has been on tour this spring making a trip for two months through the South and West. — Winthrop Chenery in Los Angeles has made some improvement and has now reached the point where he is able to walk a few steps with crutches. — Al Cluett is a man from whom we rarely hear, and it is therefore news to report that he and William Coolidge recently were on the same train to New York — Coolidge from Schenectady and Cluett from Troy — so they had a pleasant time together. — Steve Crane, although officially retired, still seems to be a busy man, according to his report that he had been engaged in New York for several weeks and would be unable to get to the reunion. — Charlie Cummings said he would be kept away by arthritis.

Bob Fuller's son James, according to report from O. B. Denison '11, received the academic scholarship for 1941 of the Worcester Woman's Club. This is the fourth year in succession that he has won this scholarship. This year he has been a junior at Syracuse University.

As these notes are being written, Henry Jackson is all set to go to Osterville to take charge of moving picture matters, including the showing of movies of former reunions and the securing of good pictures of the events of this year. — Walter James, retired as professor emeritus from Technology, says that he is pretty well "by spells," but the situation at home is such it is difficult for him to be away. — Paul Johnson '98, who is well known to many of our Class, planned to be in the East during the latter part of May and the early part of June, and he accepted an invitation to join in our celebration at Osterville. — Charlie Lawrence has not been so well of late and finally came to the conclusion that it would be unwise for him to undertake the trip to Osterville. — Walter Leland in California said that he was most sorely tempted to make the trip across the country to be with us, but he was very busy, and some of his work was for defense. — Paul Litchfield was featured by Percy Waxman in the March issue of *Cosmopolitan*. The story goes particularly into Paul's exploits in the rubber industry and the developments in that industry directly attributable to Paul's ability and foresight.



Lythgoe had to be in St. Paul, Minn., on June 10 to present a paper at a meeting of the National Association of Food Control officials. June 11 was the fortieth anniversary of his marriage, and therefore he and Mrs. Lythgoe combined business and pleasure by taking an automobile trip to St. Paul, leaving Newtonville on June 5. The Secretary has received a reprint of "The Olive Oil Racket," which appeared in the February issue of the *Nucleus*. The article tells about the shortage of Italian olive oil, which has led to increased use of adulterants and straight substitutes, which in turn increased the work of the Massachusetts Department of Public Health, food and drug division, of which Lythgoe is the director.

Ernest Moore claims that we should change the date of our celebration, as it always comes just in the planting season when he is busiest as a market gardener in Arlington. The situation is further aggravated this year by the shortage of help. — Lou Morse has had an extremely busy time during the past few months acting as supervising standardization engineer for the Air Conditioning and Refrigerating Machinery Association. The particular job is to try to adopt or suggest uniform substitutes for materials that, because of the national emergency, are no longer available. His schedule for the last week of May included attendance at the spring meeting of the American Society of Refrigerating Engineers in Cincinnati, Ohio. — Charlie Nevin and Mrs. Nevin have journeyed back to their home in Newton Centre from Florida and report a good winter. — Herbert Newell in California has a son who was graduated from the law school at Stanford University at the time of our reunion, which is Herbert's alibi for being absent. The New Hampshire legislature, of which Walter Pennell is a member, was still in session at this writing. Walter was afraid his legislative and civic duties in his old home town of Exeter, N.H., would gang up on him to keep him away from Osterville. — Elmer Robinson, although theoretically retired, is actually working on harbor defense in Portland, Maine. — L. K. Sager was going with Mrs. Sager to their summer home in Maine the last of May, but they planned to journey by auto from Maine to Osterville for the reunion. — Harold Stevens is still very much alive and kicking, and he has been seeing Admiral Bakenhus occasionally of late. — Bradley Stoughton is jumping around every minute. He was making a quick trip to California and the Canal Zone during the latter part of May, arriving back in New York on June 4, and going immediately to graduation exercises at Lehigh University. His schedule apparently did not leave any time for Osterville. — Henry Tozier had to be back in Toronto during the first week of June. He planned to be around Boston the preceding week, but of course that was too early for Osterville.

According to Admiral Bakenhus, Charlie Trout, who is Atlantic manager of the Great Lakes Dredging and Dock Company, has the award for the construction

of a large naval dry dock at Bayonne, N.J. This contract makes Charlie a very busy man. It is of interest that the father of our classmate Andrew H. Green was the principal leader in this company during his lifetime. — Lloyd Wayne's brother was taken seriously ill in Tampa, Fla., in April, and Lloyd rushed to his bedside. Fortunately, his brother made good improvement, and both were able to return to Indianapolis. Wayne was counting on being present in Osterville. — L. N. Whitney was married in Waban, Mass., on April 30 to Mabel Eleanor Hiltz. — A letter from Con Young arrived recently, reporting that he and Abby had come as far north as Bridgeport and would be settled in Bass River well in advance of the reunion. Con's old enemy, neuritis, had been giving him some difficulty and unpleasant moments during the latter part of the winter and early spring, but he had picked up so as to be able to make the automobile trip back north.

The death of Elizabeth Fisher is reported to have occurred on April 25 in California. She received her S.B. degree in geology with our Class and affiliated with '96 for a number of years. Later she changed her affiliation to '95. She was a teacher of geology for a number of years at Wellesley College and was also a fluent and prolific writer. Since her retirement she had made her headquarters at Miami, Fla., but she spent much time also in California. A letter received from her in California only a week or two prior to her passing indicated that she was apparently in good health and was making plans for the summer.

An informal report on the Alumni Fund for the year 1940-1941 has been mailed to all Alumni, to be followed by a final report in the fall. Classmates may gain some satisfaction from seeing that '96 has made a fair start, but we are in no way outstanding among the classes. Henry Grush, as class agent, is hoping that the Class may improve its record next year. Actual figures as of May 27 for the Class show that eighty-seven men contributed \$865.50, or an average of \$9.95 a contributor. The campaign for 1941-1942 is already well under way, and the results look encouraging. Actually, as of May 27, the contributors from '96 for the coming year total forty-three and amount to a sum of \$470.00, or an average of \$10.93 a contributor. — CHARLES E. LOCKE, *Secretary*, Room 8-109, M.I.T., Cambridge, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge, Mass.

### 1897

On Wednesday, April 16, Charles H. Eames, VI, President of the Lowell Textile School, was tendered a testimonial banquet in the town hall of North Billerica, Mass., by two hundred men and women of the town, in recognition of his twenty-nine years of service as moderator, a position which he has filled without remuneration. Many prominent persons of the town were present, and numerous speeches were made evidencing the high

esteem in which Mr. Eames is held. He was presented a gavel made from a limb of the famous Washington Oak of Billerica.

Thomas R. Weymouth, VI, Vice-President of the Columbia Gas and Electric Corporation, New York City, announced his retirement on April 1. In 1905 Mr. Weymouth became assistant engineer of the National Transit Company, a natural gas company in Oil City, Pa. In 1928 he went to Tulsa, Okla., as president of the Oklahoma Natural Gas Corporation. After two years he went to New York City. From 1933 to 1939 he served as chairman of the natural gas section of the combined Natural Gas and American Gas associations.

Fred E. Busby, V, head of the chemistry, dyeing, and finishing departments of the New Bedford Textile School in New Bedford, Mass., was tendered a testimonial banquet at the Tabitha Inn, Fairhaven, Mass., on March 19 by the faculty, students, and graduates of the school. The occasion was the announcement of his retirement. Mr. Busby served the Institute from 1899 to 1902 as instructor in chemistry. From 1902 until 1918 he was at the Arnold Print Works, North Adams, Mass., as superintendent of the aniline black, rayon, and noncotton departments. After one year of private business he went to the New Bedford Textile School. Because of the excellence of his instruction, graduates of the chemistry and dyeing courses have been in great demand by textile manufacturers.

The *New York Times* carried the following notice of the death on March 6 of Oswald C. Hering: "Oswald Constantin Hering, an architect and editor of the *Delta Kappa Epsilon Quarterly*, national organ of the fraternity, died . . . after a short illness in his country home in Falls Village, Conn. Mr. Hering was 67 years old. . . ."

"After being graduated from the Chauncy Hall School, Boston, in 1890, Mr. Hering studied at the Massachusetts Institute of Technology, 1893-97, and at the Ecole des Beaux Arts, Paris, 1897-99. He began the practice of architecture here in 1900 and designed many residences in Long Island and Westchester County, in the suburbs of Philadelphia and elsewhere. One was Trailsend, the home in Dayton, Ohio, of James M. Cox, Democratic Presidential nominee in 1920. He also designed the Brentano's book store at 586 Fifth Avenue in 1926 and the Lakewood Theatre, Skowhegan, Me., in 1928.

"Mr. Hering joined Delta Kappa Epsilon in 1894, was elected its national president in 1921 and was editor of its quarterly from 1925 until his death. He was also formerly editor of the *Sons of the Revolution Quarterly*. His office was at 10 West Thirty-third Street, where he resided. He was the author of 'Concrete and Stucco Houses,' 'Economy in Home Building,' 'Designing and Building the Chapter House,' and 'Down the World.'

"A former president of the Amateur Comedy Club, Mr. Hering belonged also to the Veterans of the Seventh Regiment, New York National Guard; Society of

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Colonial Wars, Sons of the Revolution, Society of the War of 1812, Veteran Corps of Artillery, American Institute of Architects, Society of Beau Arts Architects, Architectural League of New York, The Players, Dutch Treat Club and Ends of the Earth Club and the London Authors Club. He leaves a widow, Mrs. Adelaide Arms Hering." — JOHN A. COLLINS, JR., *Secretary*, 20 Quincy Street, Lawrence, Mass.

## 1900

Bugbee sends a letter from Stanford University, Calif.: ". . . I was so darned busy trying to get out copy and then to finish reading and correcting proof of my new edition before I had to jump to get out here on time, that I plain overlooked correspondence. We drove out, but not at the pace of my speedy classmate, Jim Batcheller. We detoured through the South Dakota badlands on the way to Deadwood and Lead in the Black Hills, then made a quick turn around Yellowstone Park and the Grand Canyon, on through the Jackson Hole country to Salt Lake City and the American Institute of Mining and Metallurgical Engineers meeting. We stopped at McGill and Ruth, Nev., to see the Nevada Consolidated Copper Company's mine and plant; stopped again at Reno to find a good place to settle after I retire. I have found plenty to do here, trying to uphold the M.I.T. reputation, and so on. Incidentally, to appease the daughter, I had to take in the Rose Bowl football game and give Hollywood the once over."

One of the old-timers sent in a picture of Arthur Constantine, correspondent of International News in Mexico. Connie looks in the best of health. Enclosed was a picture of his son, Artie, taken in 1938 when he was a quarterback on the American School, Mexico City, football team. Junior is now at Riverdale Country School in New York.

Jackson called recently and reported that he has been at camps Edwards and Devens as inspector of sewers. At Devens he saw Allen and Neall. Jackson is interested in following up another job connected with national defense in Newfoundland. He also reports the recent marriage of his daughter.

Notice has been received from the Register of Former Students of the death on February 1 of John W. Long, II, in Charlestown, Mass.

George E. Russell writes: "I take great interest in following your column in The Review and feel that you are doing a splendid job. I have recently returned from a week's trip through Maine, where I spoke each evening before waterworks men and fire department chiefs on protection of distribution systems during war emergencies. The talks were given at Orono, Augusta, Auburn, Portland, and Kennebunk." — Burns says that Stearns and Mrs. Stearns have returned from Orlando, Fla., where they have been spending the winter.

The following article and a picture appeared in the Boston *Herald* of April 8: "James A. Patch, chemical engineer distinguished for public health work in

Levantine countries, was elected president of the Boston Baptist Social Union. . . . Prof. Patch, who was an instructor in the American University of Beirut, then called the Syrian Protestant College, in 1900-1902, is a member of the First Baptist Church, Stoneham. He is vice president and a director of the E. L. Patch Company, manufacturing pharmacists, of Stoneham, and his home is in Carlisle."

Recent address changes follow: Mrs. D. C. Dennett, 7 Washington Street, Winchester, Mass.; Francis T. Fitch, Box 258, Parsons, Kansas; Harris G. Hooper, 463 First Street, Brooklyn, N.Y.; Paul J. Ober, 78 Waverly Avenue, Newton, Mass.; and Ralph Root, 114 Clinton Street, Brooklyn, N.Y. — C. BURTON COTTING, *Secretary*, 111 Devonshire Street, Boston, Mass.

## 1901

As these notes for the July Review are being written on May 21, our fortieth reunion on June 7 and 8 is being looked forward to with pleasant anticipation. Your Secretary, therefore, hopes the retrospection will be as satisfactory and that the new Secretary, who is to be elected at the reunion, will enjoy his contacts with the members of the Class and the preparation of the annual class letters and of these class notes as much as we have during the past five years.

The new Secretary will have the pleasure of chronicling the reunion doings either in the annual class letter for 1941 or in the next edition of The Review, which is due to be published in November.

The class notes which were prepared for the June Review on April 19 included all current class news. Since then and including May 21 the following news items have been received: Fred Davidson wrote briefly from 620 East San Salvador, San Jose, Calif., that he had just returned from an enjoyable week in the southern Californian deserts. Ordinarily we should not suppose that deserts could be considered enjoyable. However, California has so many things which are better than elsewhere, that we can imagine that even the deserts would be out of the ordinary in that state.

Two changes of address have also been received from the Alumni Office: Arthur Little, who formerly was located in Rutherford, N.J., now is recorded at R.F.D. No. 1, Box 202, Port Jervis, N.Y. Harry P. Parrock (intimately known by most of the Class as Perk) has moved from San Francisco, Calif., to 529 Franklin Street, Buffalo, N.Y.

Arthur Little, we understand, is now operating as a gentleman farmer and, we trust, is securing excellent returns from the good farm land which we believe abounds near Port Jervis. Little said definitely that he would not be able to attend the reunion. However, since no reply has been received from Parrock up to the time these notes were written, we trust that we were all agreeably surprised to see him at the New Ocean House.

We are also hopeful that because of the nearness of the New Ocean House to Boston, the new Secretary will be en-

abled to report attendance at the reunion of a number of men who up to the time these notes were written had not definitely signified whether they would be present. — ROGER W. WIGHT, *Secretary*, The Travelers Fire Insurance Company, Chapman Building, Portland, Maine. WILLARD W. DOW, C.P.A., *Assistant Secretary*, 66 Kensington Lane, Swampscott, Mass.

## 1903

The following men attended an informal dinner of the Class in Walker Memorial on March 27: Aldrich, Denham, Gould, C. F. Green, G. M. Greene, K. D. Jewett, Peaslee, and the Secretaries. We think it is a pleasant custom and one which tends to improve class spirit and interest to have a dinner together during the early spring. Those of us who were there had a good time and only wished there had been more of the Class present. Our annual dinner was held on June 7, the Saturday before Alumni Day.

J. Albert C. Nyhen died in Brookline, Mass., on March 24. He was a bacteriologist and the director of mosquito control for that town for forty years. He became well known for his laboratory diagnosis of diphtheria and was the first public official in Massachusetts to advocate the passage of laws requiring the pasteurization of milk. Nyhen attended one or two class dinners in recent years, but had been in ill-health for the past year.

A letter was received from Mrs. I. G. Lothrop, stating that her husband, Percy D., died a year ago in January in Johannesburg, South Africa. Their only son, Gordon D., is on active service in the British forces in South Africa.

George Greene and Cushman attended the funeral services of I. T. Haddock in Tiverton, R.I., on May 16. Greene wrote the following about Haddock: "The intimate friends of Isaac T. Haddock were shocked at his death by drowning on May 2 while he was on a fishing trip in Vineyard Haven Sound. — Isaac was born in Tiverton, R.I., on August 14, 1882, and attended the public schools at Tiverton and Durfee High School, Fall River, Mass., before entering the Institute. He spent practically his entire business life in the utility field. He was associated with the Cambridge Gas Light Company, first as a chemist in 1904, and later as general superintendent and vice-president. He was vice-president and general manager of the Worcester Gas Light Company, and also vice-president of the New England Gas and Electric Association from 1931 until his resignation in May, 1938. At the time of his death he was vice-president and director of the Cambridge Gas Light Company, vice-president and director of the Worcester Gas Light Company, and a director in eight other gas and electric companies of New England. He was a member of the Society of Gas Lighting of New York and the American Gas Association of New York; a member and former president of the New England Gas Association and the Guild of Gas Managers of New England; and a member of



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the Engineers Club and University Club of Boston." The sympathy of the Class is extended to Mrs. Haddock.—FREDERIC A. EUSTIS, *Secretary*, 131 State Street, Boston, Mass. JAMES A. CUSHMAN, *Assistant Secretary*, 441 Stuart Street, Boston, Mass.

## 1907

One of the most prominent men in public life in Canada today, and the member of our Class whose name most frequently makes the headlines, is Clarence D. Howe. An article in the *New York Times* of May 11 said: "The seventh airline serving New York City at LaGuardia Field began operations yesterday. Carrying Clarence D. Howe, Canadian Minister of Munitions and Supply, who was on a 'routine' defense mission to Washington, a Lockheed Lodestar arrived at 1:05 P.M. after a two-hour trip from Toronto. . . . Accompanying Mr. Howe was his wife, both of them American born. [Clarence and his wife both lived and received their elementary education in Waltham, Mass.] . . . They took a mid-afternoon plane to the Capital. The purpose of the trip, according to the Minister, was to confer on defense matters with Federal officials and to attend a meeting of the British Purchasing Commission, of which he is a member. . . . Opening of Trans-Canada's new service 'will help travel between New York and Canada greatly', said Mr. Howe, who as former Minister of Transport, directed Canadian aviation in building up a 4000-mile national air service." From Frederic H. Fay '93 I received a page of the May 6 issue of *PM*. The page was devoted to a story about Clarence, entitled, "Canada's Knudsen is a Yankee who gets the wheels turning," and beginning: "The man who builds the guns and armored cars and airplanes and ships for Canada is a Massachusetts Yankee—big, lean, hard Clarence Decatur Howe."

The article goes on: "When the last of the Chamberlain industrialists still were trying to keep the war industries in England, fearful that Canadian rivals might build up formidable competition, he sailed on the *Western Prince* for Europe, determined to bring back the blue-prints and specifications for war material Canada so badly needed. This ship was torpedoed with a great loss of life in mid-Atlantic (on December 14, 1940) and Mr. Howe spent two days in a drifting life-boat, many of whose passengers were near death when rescued. He paused in Scotland only long enough to get warm and dry and hurried on to London. His friends say he considers this a minor episode in his life. What was important was that he got most of the blue-prints he wanted." Clarence is quoted as saying: "This year we expect to ship overseas or supply Canadian troops with munitions and supplies worth \$1,500,000,000. That represents 25 per cent of the national income. It has been organized in a little more than a year and isn't a bad program for a country of 11,000,000 people."

Albert Stearns Kendall died on May 13. Born in Washington on January 7, 1883, he was educated at the Newton, Mass., High School, was graduated from Har-

vard College with an A.B. degree in 1905, and was graduated from Technology with our Class after two years, in the Course in Architecture. After three years as an architectural draftsman he became associated with the Boston architectural firm, Kendall, Taylor and Company, of which his father was a member, and continued his membership there until the time of his death. He specialized in the design of hospitals. Among those which are the product of his workmanship are the Boston State Hospital group, Boston Psychopathic Hospital, New England Baptist Hospital, and the Massachusetts Homeopathic Hospital. He was a lecturer on architectural design at the Massachusetts School of Art. He was a prominent Baptist layman, and was a trustee of Andover Newton Theological School, a 32d degree Mason, and a member of the Harvard Club, the Boston Society of Architects, the American Institute of Architects, and the Boston Baptist Social Union. Surviving are his parents, his widow, and two children—Anne Means Kendall, twenty-seven years old, and Henry S. Kendall, age twenty-one, who live at the family home, 73 Parker Street, Newton Center, Mass.

Although Albert took little active interest in the Institute or in our Class, his allegiance being more strongly held by Harvard College, it was my good fortune to know him rather intimately in a business way during former years. He was a delightfully genial, cultured gentleman. I was always impressed by the serenity of his disposition and the apparent calmness of his spirit, regardless of surroundings or conditions.

In response to my letter of sympathy sent to the widow of Albert Wiggin, who died on April 18 (see the June Review), I received on May 10 a note of thanks.

Early in March I received from Harry Moody a letter written on the stationery of the firm with whom he is an associate manager, and I noticed on the letterhead the name of Howard Marvin among the names of the partners of the firm. I knew that a man by that name was affiliated with our Class, but for many years neither the Alumni Office nor I had any address for him. I wrote to Harry asking him to find out if by chance his Howard and our Howard were one and the same man. On March 27 Harry wrote me: "I find that the Howard Marvin with our organization is our classmate, and I have just had a long talk with him in the office. I told him I was sure the Class would want to hear from him. We exchanged notes on our past misspent lives, and he has had quite varied and interesting experiences. I told him of the wonderful times we have at our five-year reunions and how well worth while it is to get together at these intervals and see the old faces again. He promised me he would attend our thirty-fifth reunion next year, and we shook hands on it. (Note these last two sentences, you readers. The dates will be June 5 to 8, 1942.) I wrote to Howard Marvin and early in May received from him a cordial note and a completely filled out class information sheet. He was at

Technology from 1903 to 1905, a student in Course II. From 1907 to 1910 he was a department foreman and superintendent of methods and equipment at the United Shoe Machinery Corporation, and then for four years held a similar position with the General Electric Company. During the next few years Howard worked for several different companies. Since 1926 he has been a partner with Stevenson, Jordan and Harrison, Inc., management engineers, with head office at 19 West 44th Street, New York City. He is a member of the National Association of Cost Accountants, the National Society of Professional Engineers, the New York Society of Professional Engineers, the Society for the Advancement of Management, and has given many addresses on cost accounting, material handling, and management problems before various business organizations and societies. Howard and his wife live at 479 Park Place, Bridgeport, Conn. They have two married sons, Charles H. '32, who lives in Stratford, Conn., and George L., who lives in Bridgeport. Howard writes: "Thanks for your kind and courteous letter. I have been such a traveling tramp since leaving Technology that whenever a reunion occurs I am usually on the far side of the United States or the longest distance from Boston. I will make the 1942 reunion if the flying weather is good or the trains are running." (Note this sentence also, you '07 readers.)

I received early in May a most welcome letter from Merton W. Sage. From 1907 to 1909 he was a chemist with Sage Brothers Company in Boston and then for two years was an assistant examiner in the United States Patent Office at Washington. From 1909 to 1912 he attended the law school of Georgetown University, receiving the degrees of LL.B. and M.P.L. From 1911 to 1917 he was a patent attorney with General Electric Company, and then he became a member of the law firm of Pennie, Davis, Marvin and Edmonds, with whom he is still associated, with offices at 247 Park Avenue, New York City, directly behind the Grand Central Terminal. For the most part, he specializes in metallurgical and chemical patent matters, the firm's chief professional contacts being with the management of industry. Six other Technology men are in the company's office: S. Howell Brown, Jr., '24, John Hoxie '25, George E. Faithfull '26, Harold A. Traver '32, Cyrus S. Hapgood '33, and Merton S. Neill '34, who is Merton's nephew. Merton is a member of the American Bar Association and the American Patent Law Association. He has two daughters and a son. The elder daughter, Elizabeth, is the wife of Theron Batchelder, who is with Eastern Gas and Fuel Associates, and lives in Wellesley, Mass. The Batchelders have a daughter who was born in July, 1940. Merton's other daughter, Barbara, was graduated from Connecticut College in 1940 and is living with her parents. The son, Harry, is in the class of '42 at Yale, taking the course in chemical engineering. Merton writes: "At the moment, we have a foster child, Kevin Stock, of



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Bristol, England, an *évacué*, living with us for the duration of the war. He is fifteen years old, and his greatest enthusiasm about America is its educational school system. The girls are all 'super.' Incidentally, he has also noted with relief the complete abolition of the 'cane' in our schools."

Late in April, I had occasion to talk on the telephone with E. Stanley Wires, and as a partial result of this conversation and a subsequent note from Stan I have interesting information regarding his five children. The oldest, Barbara, born in 1910, is now Mrs. Howard K. Bartow. Her husband is with the Bethlehem Steel Company and had charge of the refitting of the *Bear* for Admiral Byrd. They live in Hingham, Mass., and have two children, ages four and three. The next daughter, Cynthia, born in 1912, is a second-grade teacher in the William Penn Charter School in Philadelphia. The third daughter, Helen, is Mrs. John F. Groden. Her husband was graduated from Harvard Law School and is a practicing lawyer with a fine law firm in Boston. They live in Cambridge and have a daughter born in April. Helen studied painting at the Museum of Fine Arts School, Boston, for several years. The older son, born in 1922, is six feet three inches tall and is a member of class of '44 at Haverford College at Haverford, Pa., taking a premedical or biology course. He spent a summer on the 1,200-acre Morgan horse farm at Middlebury, Vt., through an arrangement made by our Phelps Swett, who is a professor at Middlebury College. The younger son, William, born in 1927 is six feet four inches tall and has just finished his last year at Wellesley, Mass., Junior High School. "He is the only musician of the family, a trombone player, and an early morning practicer (6:30 A.M.)," Stan says.

Stanley has been associated since 1909 with Paul Cummings of our Class under the business name of E. Stanley Wires Company, Inc., tiling and building specialties, office at 120 Boylston Street, Boston. They were awarded a contract for the \$80,000 tile installation in the new New England Mutual Life Insurance Company home office building erected on the site of the old Rogers and Walker buildings of the Institute. They have contracts for four freighters of the American Export Lines, Inc., being built at the Bath Iron Works Corporation, Bath, Maine, for tiling about twenty rooms in each vessel, and a tile contract for the new infirmary building at Wellesley College. Last year they completed the tile work in the M.I.T. Alumni Pool and the Briggs Field House. Stanley's home is at 18 Whiting Road, Wellesley Hills, Mass.

A few months ago, after receiving from the Alumni Office information regarding the address of Edward Carleton Story, whose whereabouts had been unknown for many years, I wrote to him. Late in April, I received a delightful letter and information sheet. Thus still another man is brought into close and friendly touch with our class organization. Ed Story came to the Institute from Lynn,

Mass., Classical High School in 1904, was a student in Course VIII, option 3, until 1908. He has always been an affiliate of our Class. From the fall of 1909 until 1918 he was an engineering assistant with the consulting engineering firm of D. C. and William B. Jackson in Boston, and after they discontinued their business was with the appraisal staff of the board of public utility commissioners of New Jersey until the end of 1919, when he went to Allentown, Pa., in connection with appraisal work being done on a group of properties, afterwards merged to form the Pennsylvania Power and Light Company. He has continued in various capacities with this concern, which has been enlarged until it is now a \$200,000,000 corporation serving the greater part of eastern Pennsylvania. At present he is the head of the inventory division in the second vice-president's office. Ed was married in 1910 and has two daughters. The older, Ruth, received a B.S. degree at Keystone State Normal School, Kutztown, Pa., and was married in 1939 to Robert A. Kramer. The Kramers live in Allentown. Madeline, the younger, is twenty-six. Ed's first wife died in 1932, and he married again in 1934. His residence address is 318 South Fulton Street, Allentown, Pa., and his office is at 901 Hamilton Street in the same city.

The *Wall Street Journal* of May 13 contains a long article about the American Viscose Corporation, the largest rayon producer in this country, making about thirty per cent of the total United States output. The corporation, for many years an American subsidiary of Courtaulds, a British company, was purchased in March from the British government by a group of seventeen investment banking firms.

Among what the article calls "a blue ribbon board of directors, including bankers and industrial leaders," elected to supplement the former board, is our Jim Barker. Jim's address is now 1430 Lake Shore Drive, Chicago. — BRYANT NICHOLS, *Secretary*, 126 Charles Street, Auburndale, Mass. HAROLD S. WONSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

## 1909

In response to my inquiry of last February, about the first of May I received the following reply from our classmate, E. M. Bettington, who, some of you may remember, came to the Institute from South Africa, and who, since graduation, has been living in England. During the World War he was a member of the Royal Air Force as a squadron leader. At present he is vice-chairman and sales director of Aviation Developments, Ltd., 7 Woodfield Road, Welwyn Garden City, Hertfordshire, England. He says: "Your sympathetic remarks and good wishes in our hour of trial are, I can assure you, very greatly appreciated. The way you people and your wonderful President have stood by us is encouraging and stimulating and certainly beyond anything we or anyone else could rightly expect. I fear that we should indeed have been in bad case without your country's magnanimous help;

that it will go down in history as an epoch-making event goes without saying.

"As to my own doings — having participated in two wars and being past the military age, I am now a director and an active participant in a company connected with the aircraft industry and, in common with most others, am working seven days a week, so have little leisure for writing. I am on duty tonight, fire watching that is, on the lookout for incendiaries, and so I am taking this opportunity to write. This breathing space is made possible by the fact there is no alert on for the time being and so there is no necessity to be out of doors.

"There is much I *might* tell you but little I *can* without indiscretion. This place is about twenty miles north of London and will be my address for the duration of the war, I hope. In common with a great many others, my house has suffered bomb damage, but it was trifling compared with most, and I have seen a good deal of destruction, as my business takes me all over the country. What has impressed me more than anything else, however, is the stoicism and courage of the womenfolk and especially the poorer people in our big cities. Their attitude is a revelation and a fine lesson to those of us who should be better able, and who can better afford, to stand such trials and losses. We are all immensely proud of the way our boys in the Air Force have stemmed the tide, especially in the earlier stages; and now that such material aid is coming from your country, we have our heads high in the air and are more than ever confident of victory some day. . . . My best to all old friends, and all good wishes. . . ." With Bettington's letter came a pamphlet, "Battle of Britain, August to October 1940," an intensely interesting account of the activities of the R.A.F. last fall.

Alice Curtis Desmond's latest book for older boys and girls, *For Cross and King*, an historical story of South America in the year 1852, has just been published by Dodd, Mead and Company. This book was inspired by the Desmonds' travels several years ago in South America.

Sam Main, your Secretary's younger son, has been playing in *Twelfth Night*, with Helen Hays and Maurice Evans, touring several of the larger eastern cities this spring. — Derick Hartshorn is now with the Babcock Printing Press Corporation, New London, Conn.

Through the courtesy of Ed Howe '10, I received some clippings concerning Tom Desmond's activities in the New York Senate. His Desmond-Mitchell urban redevelopment corporation bill became a law with the signature of Governor Lehman about the first of May. This bill permits the creation of privately financed redevelopment corporations to re-habilitate city areas found by the city planning commission to be unsanitary or otherwise substandard. According to a clipping, Tom has also introduced a bill "for scientific tests of drivers and worked out determinations far beyond the range of mere breath-smelling. He figured on a 160-pound driver, eight ounces of 100-proof

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hooch, ten minutes, 21-100th of one per cent alcohol blood content, and its rate of diminution in time, and this and that — all in his routine procedure as a former engineer, who was shaping skyscrapers like mud pies almost before he was out of short pants. It's a far cry from the picture of the drunkard's stomach in the physiology books, with which we used to dismiss such matters; also a nice bit of case history in the increasing complications of the machine age."

The Boston *Herald* of May 21 carried a picture of John Willard's daughter Virginia, greeting her husband, Nathan Wentworth, upon his arrival in New York by Clipper. Wentworth was the manager of the Paris bureau of the American and Foreign Insurance Company and has been in France since the German occupation. Virginia and her daughter, Linda, had a harrowing return trip to the States on the S.S. *Washington*, which was held up by a submarine. An account of this experience appeared in the notes of last November. — CHARLES R. MAIN, *Secretary*, 201 Devonshire Street, Boston, Mass. *Assistant Secretaries*: PAUL M. WISWALL, MAURICE R. SCHARFF, New York; GEORGE E. WALLIS, Chicago.

## 1911

A letter is on hand from Ina MacPherson of Framingham "closing the Denison anniversary account with an enclosed check," boosting the total to 131 silver dollars. Sara and I are more appreciative of this fine honor from you classmates than we can adequately express. — By May 23, forty-three classmates had registered for the reunion, indicating a total attendance of seventy-eight. At that time, late registrants and sudden make-up-their-minders were expected to swell the total to one hundred or more. Watch the first fall issue of *The Review* for '11 reunion highlights.

Ray Lord, VI, in rounding up the Rhode Island gang, discovered that William R. Walker, IV, former Providence, R.I., architect, died on September 26, 1936. He was a special student in architecture with us for part of the senior year and never had been active in class affairs.

Did you see the attractive picture of Marie Herlihy, daughter of John and Mabel, in the Boston Sunday *Herald* of April 27? You missed something if you didn't; she looks like her mother. The picture was taken during the annual convention of the Federation of College Catholic Clubs at Hotel Somerset, Boston, where she was a delegate from Jackson College, Medford.

At exercises formally dedicating Northeastern's new engineering building on Huntington Avenue, Boston, in mid-May, our own Carl Ell, XI, President of the university, unveiled the dedicatory bronze tablet in the foyer naming the new building "Richards" in honor of James L. Richards, a member of the corporation of Northeastern.

Your Secretary's son, Orville B., Jr., was a candidate for a bachelor of science degree at Bowdoin College in mid-June and, having already enlisted in the Naval

Air Reserve, will report for active training at the Quantum air base on July 15. Following four weeks' preliminary work there he will be transferred to Pensacola, Fla., or Corpus Christi, Texas, for flight training for eight months, followed by three years of active service.

Emmons Whitcomb, X, New England traffic manager for United Air Lines, had his company's big twenty-one-passenger Mainliner in Boston for a couple of days in mid-May and gave a number of metropolitan Boston businessmen courtesy flights to stimulate interest in air travel.

Accompanying his registration for the reunion, Art Leary, XI, for many years teacher of mathematics at Boston English High School, wrote this message: "I finally have a promotion. I am now located at Hyde Park High School, Boston, with the rating 'head of the department of mathematics.'" Congratulations, Art, and more power to you!

At long last came a letter from Cleon Johnson, X, who left Boston and located in Chicago in the latter part of 1940. He says: "In moving to Chicago, I did not change company connections. The move was made because Chicago was more suitably located with reference to the activities of the interests with which I am connected. For the past four years I have been technical director for the Continental Carbon Company, with principal office in New York and with plants in the panhandle of Texas. The company manufactures carbon black, which, as you know, goes chiefly into the rubber industry and also into the printing ink and paint and varnish industries.

"While in New York I had to travel a great deal and left the family in Needham, Mass., where they were well located and had many friends. During this same time I was also acting as technical director for Wishnick-Tumpeer, Inc., which sells carbon black and a very complete line of chemicals to the rubber, paint, printing ink, paper, and other industries, with offices in New York, Boston, Chicago, and London.

"Recently the latter company opened a research laboratory here at 6130 West 51st Street, Chicago, for the development of new products, and Continental Carbon Company carries on its research in the same laboratory. With this change, I have moved the family to suburban Hinsdale, Ill., and have been able to see a great deal more of them than in the past four years.

"On the personal side, I can report that I have a son who was graduated from Dartmouth in 1936; a married daughter, Boston University '39, and two daughters, aged seventeen and nine, who are with us here. Hinsdale is about seventeen miles out of Chicago and quite convenient for traveling to work. It is like a New England town in physical appearance, particularly in its wonderful elm trees."

Bill Warner, I, from Nowata, Okla., made a bid for the reunion long-distance honor. Mrs. Warner has not been very well for the past year, and she preferred to stay in Boston rather than go to Plymouth. Bill wrote: "As you may remember,

we have a son attending Harvard Graduate School. . . . My oldest son, Bill, is leaving for Hawaii in the morning (May 8) to become a pursuit pilot in the United States air forces in the Islands. He completed his work in Texas last week and is now an officer on active duty. My youngest son is twenty-one years old and is in a position to tell the old man what to do and how to do it. The middle one is the one in Cambridge. He came back from England on the famous *City of Flint*, when the survivors of the *Athenia* were picked up. You can see that I am getting old."

Among the disappointed '11 men who found it doubtful if they could get to the reunion as they had hoped were pals Syd Alling, VI, and Frank Taylor, VI, for years with the Rochester (N.Y.) Gas and Electric Corporation. In May, Syd wrote: "For the last year Frank Taylor and I have been making plans to attend our thirtieth reunion, and up to late April we were all set to sign up. . . . There is a great press of work here. . . . Like everyone else, we are short-handed, some of the fellows in the department having gone into the service. This inability to attend is a great disappointment to both of us, and I guess the best we can do is to point toward the thirty-fifth reunion. . . ."

Thede Polhemus, XI, now operating the Momex Mining Company in Silver City, N.M., wrote: "You used to hear from me regularly before the depression, but that did something to me. . . . I am down here in a really glorious and interesting country running a small placer property and living my old age amid mountains and desert and enjoying every minute of it. The operation is my own, and I am just getting into real production. Up to this time it has been all outgo, but I seem to be turning the corner now and if things go according to expectations, you shall hear from me with a donation soon. . . ."

"My folks are both still living in Newton Centre, and naturally I'd like to see them. I was on last fall for Thanksgiving, but spent all my time with the folks and saw none of my old friends. When you are out this way, look me up."

Oliver Powell, XI, in the shoe game at Auburn, N.Y., with Marshall, Meadows and Stewart, Inc., wrote: "I regret my inability to be in Plymouth or Cambridge. . . ." Mrs. Powell had been in southern California for four months to see if it would alleviate an asthmatic condition that developed two years ago, and she was due to return on June 1. On the fourth their son, Bob, was to be graduated from the Carson Long Institute, New Bloomfield, Pa. With these happenings and business as is, O. D. couldn't take the time or the effort (for Mrs. P.) required for the reunion.

He continued: "If Howard Ireland, XI, knew I were writing to you, I know he would want to be remembered to you and all the other fellows. Howard and I are very active in the Boy Scouts, both being on the executive board of Cayuga Council, and on troop committees. The work is our hobby I guess, because we enjoy it a great deal. It takes plenty of time,



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though, but we both feel that the boy scout movement can be a great agency to strengthen our democracy.

"We hope you and Mrs. Denison had a fine twenty-fifth wedding anniversary and that you will enjoy your fiftieth! June 11 is only our twentieth. Speaking of anniversaries reminds me it was just twenty-three years ago today (May 10) that I went out of Hoboken on the *George Washington*, landing in Brest ten days later after an eventful trip. The hillsides of Brest Harbor were a beautiful green that morning when we sighted them after a submarine scare. I wonder if there is any green left there after the blasting the port has had in recent months. . . ."

Still more address changes have come to light through reunion attendance plugging: John R. Bowman, XI, 39 Early Avenue, Medford, Mass.; James R. Carpenter, I, 3081 Indiana Street, Coconut Grove, Fla.; Luis deFlores, II, 155 East 72d Street, New York City; Louis R. Golden, VI, 709 Centre Street, Newton, Mass.; Laurence G. Odell, XIV, 404 Riverside Drive, New York City; Silas M. Ratzkoff, II, 245 East 21st Street, New York City; Ralph E. Runels, I, 15 Harland Avenue, Lowell, Mass.; Howard R. Schulze, IV, 49 East 51st Street, New York City; Guy W. True, Box 318, Balboa Heights, Canal Zone; and Charles S. Williams, Jr., V, Minnisink Road, Short Hills, N.J.

So ends another volume of '11 notes in The Review, in which we have kept up our 100 per cent record since graduation of always having some notes in every issue publishing them. Our parting thought: If you classmates have enjoyed reading the notes half as much as your Secretary has enjoyed preparing them, the question, "Is everybody happy?" is decidedly *de trop!* — ORVILLE B. DENISON, Secretary, Chamber of Commerce, Worcester, Mass. JOHN A. HERLIHY, Assistant Secretary, 588 Riverside Avenue, Medford, Mass.

## 1912

James A. Cook, VI, sends us a brief note in which he says: "Despite the troubled times, I hope we can have a celebration of the thirtieth anniversary of the Class, when we can have time to talk things over. I hope the world will be more peaceful by then." We echo "same here" to Jim's "hope" for the reunion next year and for a more peaceful world at that time.

A letter from Raymond E. Wilson, II, was addressed to Jim, who is giving his time and services in behalf of our Alumni Fund. Wilson's present address is 4000 Cathedral Avenue, Washington, D.C. Here's what Ray has to say about his new duties: "I was called to Washington the first of February to set up the National Bureau for Industrial Protection. This bureau was organized by a committee representing all fire and casualty insurance interests in the country as a clearing house for the dissemination of information and advice to the various governmental departments which are interested in maintaining uninterrupted production

in the many plants where there are government contracts in connection with the national defense program. As you can appreciate, this is rather a large order, and the work is increasing rapidly. Unfortunately, because of illness, the man from the stock companies selected to work with me has not been able to be present, so much of the work has fallen to me. We are, however, building up a staff of representatives from the various insurance companies and inspection bureaus, and the work is now well under way.

"So far the only '12 man whom I have seen in town is Aksel Pedersen, who, as you probably know, is a patent attorney. I visited his home in Chevy Chase recently and spent a most enjoyable evening. He has some excellent movies of the last '12 reunion." — FREDERICK J. SHEPARD, Jr., Secretary, 125 Walnut Street, Watertown, Mass. DAVID J. MCGRATH, Assistant Secretary, McGraw-Hill Publishing Company, Inc., 330 West 42d Street, New York, N.Y.

## 1913

Larry Hart is our class agent for the M.I.T. Alumni Fund. His report of April 10 was mailed to each member of the Class, and it was headed "To the Beavers of 1913." "Beavers" is the name we gave ourselves in student days. Perhaps the name "goats" is nearer the mark. In the group of classes 1910 to 1914, inclusive, we are the goats in point of dollars, with an average per capita contribution of \$9.45. Larry will be back at you this year.

Under the letterhead of Daniel Russell Boiler Works, Inc., dated April 5, comes an excerpt from a news article describing a party held on February 22. During the evening a waltzing contest was held, with approximately one hundred couples of all ages competing. The judges awarded the prizes on the basis of appearance, gracefulness, skill, and all-round performance. Mr. and Mrs. Harry Dexter Peck of Sharon and Providence easily led the field and won first prize. The local talent had better look to their laurels hereafter. Thank you, Jim Russell, II, for this nice bit. Imagine the crotchety patent lawyer doing a thing like that.

Bill Brewster, II, is getting further up there. The Boston *Post* of April 23 printed his picture. (It looked like our twenty-year-old "Technique" executive.) The occasion was the announcement of Bill's election to the board of the State Street Trust Company, Boston.

A. Lawrence Kocher, VI, wrote as follows from Black Mountain, N.C.: "I was interested to hear of your visit to Black Mountain. This is indeed attractive country. What the hot summer will be, we have yet to learn. This is supposed to be quite a summer resort, however, with warm days and cool evenings. There is no exceptional news to report regarding my work. I am architect for the new buildings being built for Black Mountain College. The college's present quarters are leased, and we will move over to the new site which is on property owned by the college, about four miles from here, the first part of June. I am remaining here

during the year as visiting professor of architecture under a resident artist's grant. . . ."

Professor Kocher has designed an attractive, highly functional building for this unusual college, which has a beautiful setting in the mountains near Asheville, N.C. The design calls for all natural materials that are near at hand and for other materials which can be applied with a minimum of skill. The students undertake most of the labor, so that the cost of building is about one-half what it would be on a regular contract basis. Maybe there is something to the idea that pushing a wheelbarrow is wholesome and effective exercise for college students.

Charles D. Swain, II, a Commander in the United States Navy has been transferred to Pearl Harbor, Hawaii. George Bakeman, XI, is now at Medical College of Virginia, Richmond. George W. Forrester, X, has moved from Lynn to Springfield, Mass. Alan H. Means, XII, is at Motor Inn, San Luis Obispo, Calif. Benjamin B. Tremere, Jr., III, who has been running the Atkins Appliance Corporation in Palmer, Mass., is now living in Norwalk, Conn.

The exhortations of Dennie Denison '11 to his classmates on their thirtieth reunion this summer remind us that our own celebration is only two years away. — FREDERICK D. MURDOCK, Secretary, Murdock Webbing Company, Box 784, Pawtucket, R.I.

## 1914

A recent Boston visitor from New York was Chet Ober, who came for the celebration of his mother's seventieth birthday. Chet's parents recently moved from Newport, R.I., where they lived when Chet came to Technology, to a suburb of Boston. Chet had with him his younger son, Arthur, who is still in grade school. His older son, Richard, is a student in mechanical engineering at Cornell University. His daughter, Louise, is at Endicott College at Prides Crossing, Mass.

After thinking he was settled for some time, at least, in the First Armored Corps at Fort Knox, Alden H. Waitt, a lieutenant colonel in the Chemical Warfare Service, was suddenly moved to Washington, where he is now serving with the air corps section of the operations and training division of the general staff.

Several '14 men broke into print during the past few weeks. In a two-page article in the *Christian Science Monitor* for May 10, entitled "Yankee Ingenuity Turns on the Steam," E. C. Crocker took the headlines. The central picture was that of Karl T. Compton, President of the Institute and chairman of the new products committee of the New England Council. On both sides were pictures of Crocker, one showing him in his odor research work and the other in a typical laboratory pose.

How many classmates who have seen *Yes, My Darling Daughter* on Broadway realize that the author of the play was Mark Reed of our Class? Although your



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Secretary saw this play long ago and noted the author's name, he hesitates to confess that it was not until the M.I.T. Drama Club presented that play and in the publicity called attention to the fact that the author was a '14 man, did he recognize Reed as a former member of the Course in Architecture of our Class.

The Providence Journal of April 13 devoted a long article to the activities of Norman MacLeod, President of the Abrasive Machine Tool Company in East Providence. This article told about the large addition that Mac has put on his plant, including a penthouse where he lives when he doesn't have time to go home. Mac has two farms, one at Kenyon, where he makes his home, and the other at Richmond, R.I. As Kenyon is some distance from the plant, the penthouse idea in these crowded days has real merit. Mac's farms total about 700 acres, and on them he has over 1,000 turkeys, and 1,200 laying hens, with double this number coming along. Besides running his plant and managing the farms, he still finds time to be the local representative of the machine tool division of the Office of Production Management and is on numerous defense committees. Officially, Mac is a lieutenant colonel in the 302d Field Artillery Reserve.

Two Classmates have received citations for their twenty-five years of service in the telephone company — Herman Affel and O. C. Hall. Affel is assistant director of transmission development. He joined the telephone company in 1916, and has spent substantially all of his time in transmission studies, particularly in those pertaining to carrier and radio-frequency transmission. He has worked on repeaters and program circuits as well. His present work places him in charge of the telephone company's activities in the design of carrier repeaters and terminals, voice frequency repeaters, and voice-operated and radio-connecting systems. Among his 125 patents are the dominating one on pilot-channel gain control for multiplex carrier systems and the basic patents in the field of automatic volume control in radio and wire systems. — O. C. Hall started working during the summer of 1912 as a lineman for the Southern New England Telephone Company. After graduation he went with the long-lines department and was stationed at New Haven, Hartford, Providence, and New York. Later he was transferred to the long-lines engineering department. Then, after a leave of absence, he joined the Bell Laboratories, where since 1935 he has been in the switching development department.

This is the last issue of The Review until the fall. Your Secretary hopes that each member of the Class will find a way of working in some vacation time this summer, although it is certain that many in industrial plants are not going to have much spare time on their hands. A pleasant summer to all! — H. B. RICHMOND, Secretary, General Radio Company, 30 State Street, Cambridge, Mass. CHARLES P. FISKE, Assistant Secretary, 1775 Broadway, New York, N.Y.

## 1915

*To the good Class of 1916 the Class of 1915 extends its heartiest congratulations on its twenty-fifth reunion. May the memories and friendships from this reunion remain with 1916 forever.*

What better reminder of our own happy twenty-fifth reunion last year than a twenty-sixth get-together this year? And this we had, in a small measure, with a class dinner in New York City at the Technology Club on May 23, followed by a class luncheon in Philadelphia at the Manufacturers Golf and Country Club the next day.

Our guest of honor in New York was James C. Duff '86, V. Dr. Duff, I am told, is the oldest alumnus in New York City, and it was indeed a pleasure to have him with us. We enjoyed his stories immensely, and his activity, personality, and wit are an example for us to remember when we have been out of Technology as many years. The following seventeen New York classmates attended: Everett R. Brigham, Everett S. Coldwell, Fred L. Cook, Alan S. Dana, Chauncey H. Durkee, Ralph Hart, Joseph M. Livermore, Henry L. Marion, Millard B. Pinkham, Tower Piza, Cliff E. Sifton, Edmund R. Stearns, Wilbur A. Swain, Kebe Toabe, Raymond H. Walcott, Charles W. Williams, and Louis H. Zepfler. Six from Boston were present: C. Weare Howlett, Azel W. Mack, George T. Rooney, Frank P. Scully, Henry C. Sheils, and Max I. Woythaler, making a total of twenty-four Alumni at the dinner.

We regretted that Mary Plummer Rice could not attend the dinner. Mary came into the Technology Club from her home in Westchester, but because of club rules she was not allowed in the dining room. George Rooney, Henry Sheils, and your Secretary, however, had a chance to talk with Mary, and it was delightful to see her. We have mailed her a signed greeting from the men at the dinner.

We showed Herb Swift's collection of class movies, told stories, and generally had a small Oyster Harbors' party. Because of legislature business in New Hampshire, Speed could not be with us, but he sent his movies. Ralph Hart put on the show for us. After dinner six of us went to Ralph's apartment for further entertainment. Frank, Max, and Weare returned to Boston, while George, Henry, and your Secretary went on to Philadelphia Saturday morning for a continuation of the "little Oyster Harbors' party." Herb Anderson, Henry Daley, and Gene Place organized the Philadelphia party and did a great job in getting the following to attend: Lawrence H. Bailey, Richard O. Bailey, Grev Haslam, Charles W. Noyes, Sol Schneider, Bill Spencer, Fred W. Stetson, and Ed Whiting. Only thirteen were present, as Henry Daley, who did so much work for the luncheon, was kept home by influenza.

Herb Anderson, the gentleman farmer, was a perfect host at his country club, and it certainly is a beautiful spot.

After lunch we showed our pictures again and lounged on the club piazza overlooking a very attractive golf course. Then some of us went to Herb's farm to visit his assorted menagerie. Herb lives in a delightful old farmhouse nestled in a countryside that reminds one of the hills of New England.

Hank Marion had such a good time at the New York party that he and Mrs. Marion went to Philadelphia to spend the afternoon and evening with us. The Marions joined Ed and Mrs. Whiting; Gene and Mrs. Place; Herb and Mrs. Anderson, and Mrs. Anderson's guests, Miss Norris and Dick Bailey; and us three for dinner. We had a jolly evening enlivened with many colorful stories and experiences. We regretted that Jimmy Franks could not attend. He is still in the Germantown hospital, where he has been laid up for some time.

Sunday, on our way back to Boston, we stopped for an enjoyable visit with Henry and Mrs. Daley and her family. In New York we stopped at Ralph Hart's apartment and finally reached home late Sunday night after a very happy twenty-sixth "reunion."

Men whom we had not seen for twenty-six years were: Jerry Coldwell and Ray Walcott in New York; and Dick Bailey, Grev Haslam, Charlie Noyes, and Fred Stetson in Philadelphia. These class friendships and loyalties and interests touch me so deeply I really have exhausted my sentimental expressions to tell you properly how much they mean, but let it go that this certainly is a splendid Class with everybody in it close friends.

Two of our regular attendants, Jim Tobey and San Willis, unfortunately discovered at the last minute they had to be absent. Howard King wrote sending us his regrets and regards from Pulaski, Va., where he is working on a defense project for the Mason and Hanger Company.

The Textile World of May says: "R. G. Knowland, vice-president in charge of manufacturing, will be on leave from Bigelow-Sanford Carpet Co., for work as chief of district offices of the Defense Contract Service of the Office of Production Management, Washington. He will have the direction of operations of the 36 field offices of the defense contract service." Our congratulations to Dick on this important job.

The annual grudge golf match among Marshall Dalton, Weare Howlett, Archie Morrison, and George Rooney is scheduled to take place soon. The results will be interesting but uncertain, as a good deal will depend on the pregame preparations. Personally, I can vouch for Jack Dalton but not for the other three.

In describing the Boston movie party in the May issue I failed to say that Teresa Sheils, Henry's younger daughter, entertained us with her singing during intermission. She has a clear, bell-like soprano voice which was delightful to hear.

The following letter from Frank Scully gives a well-deserved boost to our Phila-

1915 Continued

delphia gang: "When I was in Philadelphia last month I met Ed Whiting and went with him to a Technology Club of Philadelphia meeting. Apparently since the reunion the '15 group have been very consistent in their attendance. At the meeting I visited were Herbert Anderson, Richard O. Bailey, Henry Daley, Grev Haslam, Gene Place, and Ed Whiting. Oden B. Pyle '16 was also with our group. At the previous meeting in December the following were present: Anderson, Lawrence Bailey, Dick Bailey, Daley, Jim Franks, Stanford Guthrie, Haslam, Place, George Stetson, and Whiting. Jim Franks was in the hospital in March, but I was able to call him up."

Mrs. Susan Palmer wrote from Houston, Texas, giving us the details of Guernsey's sudden passing: "Guernsey died on February 8 at 12:45 A.M. It all happened so suddenly at the last. He was at the office all day, ate his dinner, played bridge until about 10:30, went to bed, and was reading — when all of a sudden he said he felt peculiar. In about one hour he was gone. We do miss him so much, and it is very hard, but we must go on as he would want us to. We moved four weeks ago and hope to be straightened out after a while. Our new address is 2214 Bissonett. I had a very nice letter from Mrs. Edgerton a day or so ago. I hope this finds you well and I do appreciate your letter and kind thoughts."

It is sad to recall the death of Hjalmar Cedarstrom at 39 Madison Avenue, Everett, Mass., in March. Mrs. Cedarstrom wrote that Hjalmar regretted not having been at our reunions but had planned to come to the next class affair. To Mrs. Cedarstrom goes the sympathy of the Class.

By the time you read this I hope that many of us will have enjoyed the good-fellowship of the class cocktail party on Alumni Day. In closing this year's notes with friendliest feelings, I want to thank all the classmates who have "helped Azel." — AZEL W. MACK, *Secretary*, 40 St. Paul Street, Brookline, Mass.

## 1916

Classmates will be interested in the news of the marriage of Meade Bolton to Helen Reinman Jones in New York City on October 30. The Boltons are now living in Balboa Heights, Canal Zone.

By the end of May there were about 125 classmates signed up for our reunion at the Oyster Harbors Club. — On Alumni Day, June 9, a memorial to Richard C. MacLaurin, a former President of the Institute, was dedicated under the sponsorship of our Class. The memorial is located in the main lobby of Technology, under the dome. — JAMES A. BURBANK, *Secretary*, The Travelers Insurance Company, Hartford, Conn. STEVEN R. BERKE, *Associate Secretary*, Coleman Brothers Corporation, 245 State Street, Boston, Mass.

## 1917

The following interesting account of a class meeting in New York was sent us by Winfield I. McNeill: "We held a '17

meeting at the Technology Club of New York with the following people present: Ray Brooks, Enos Curtin, William B. Hunter, Ken Lane, Richard O. Loengard, Win McNeill, James F. Maguire, Edward Payne, Dix Proctor, and Leland C. Roberts. Inasmuch as these people have shown an interest in the reunion, we have automatically designated them as the reunion committee. The committee is, of course, subject to additions whenever we find someone who is willing to work.

"The general consensus at the meeting seemed to be as follows: (1) make the reunion a stag affair; (2) no costumes; (3) an informal program including golf, boating, tennis, fishing, and so forth. The 'and so forth' includes crap games or any other form of entertainment that usually goes with such affairs.

"I wrote the Oyster Harbors Club for a definite reservation for next year and asked for complete rates, to be discussed on Alumni Day this year. Our general plan is to appoint regional chairmen in the various cities. These chairmen will be responsible for stirring up interest among the '17 men in their areas. The opinion was that we need not take any active steps in the matter until after the first of next year."

Walt Keith '14 dropped into the Dean's office late in April and said that Lin Noyes had been elected vice-president of the American Newspaper Publishers Association. Your Secretary later learned that this organization is the national association of daily newspapers of the United States and Canada. The *New York Times* of April 25 said this was the first time a publisher of a small daily newspaper had been put in line for the presidency of that organization. The term of office runs one year, and the president is usually elected for one year and then re-elected for a second term. The vice-president follows the same procedure and normally succeeds the president. On that basis, if they hold to custom, Lin should be the president in 1942.

Lin was president of the midwestern Inland Daily Press Association some six years ago. He has been on the board of directors of the American Newspaper Publishers Association for the past several years.

Phil Hulburd's letter is illuminating, but not on the election: "My last connection with Lin was by telephone during the Associated Press convention in New York. Irving and Kay McDaniel and Lin were apparently having themselves an evening just before Mac sailed for Trinidad on navy business. My phone rang at 12:30 A.M. and a voice said, 'This is the Pot of Gold program, and you have won \$1,000.' In my sleep-sodden condition I had some trouble getting the situation untangled and only became awake enough near the end of the conversation to realize the identity of the artists on the other end of the wire. I don't remember that either Lin or Mac had much to say beyond the fact of Mac's new assignment and the usual inquiries as to our respective states of health."

I understand that Walter Harrington is now advertising manager for Hearst's *New York Journal and American* and is doing very well, thank you.

Too late for inclusion in Ted Bernard's volume of notes was a letter from Claudius H. M. Roberts from 617 Via Horquilla (that means Hairpin Street), Palos Verdes Estates, Calif.: "... In case some of my progeny have been overlooked, I'll start by calling the roll: Patricia, born in Houston, Texas, on February 20, 1930; Samuel Adams, born in Long Beach, Calif., on May 19, 1932; and Thomas Stovall, born in St. Louis, Mo., on June 3, 1936.

"The Tretolite Company, St. Louis, Mo., with which I started work in 1923, merged with Petroleum Rectifying Company, Los Angeles, Calif., in 1930. In 1931, I transferred to the latter to carry on research in electricity and physical chemistry, becoming director of research. In 1935, I was transferred back to Tretolite Company as director of research, and I stayed in St. Louis two years. In 1937, basic research for the corporation was transferred to Los Angeles, and I returned here as director of research. In the spring of 1940, I was made a vice-president of the corporation, and that is the story to date. My job is directing research in chemistry for Tretolite Company and in electricity for Petroleum Rectifying Company, and running the laboratory research and development work for the latter. The former company dehydrates and desalts petroleum chemically, while the latter does the same job electrically.

"During all the time since I resigned from the regular Army in December, 1922, I have maintained my reserve commission and have been reasonably active in reserve work. For the last fifteen or sixteen years I have been a major and for some time have been expecting promotion to lieutenant colonel. At present, the War Department has been after me for extended active duty, and, unless the company can succeed in having me deferred as a 'key man in an industry essential to national defense,' I shall probably be back in the Army by or shortly after July 1.

"That, I think, is about the whole story — except that during the eight years that we have lived in California, we have become quite enthusiastic about the place. As far as I am concerned, I could live the rest of my life west of the Rockies and die happy. Present indications, however, are that all of us are much more likely to die elsewhere and not so happily."

William C. Mehaffey, a lieutenant commander, now has a home address at 1630 Greenbrier Street, Arlington, Va. — Rumor has it that Paul Bertelsen is now in Toledo associated with an airplane company, but that he also has a residence at 147 East 55th Street, New York City. This information is subject to confirmation and further details.

Does anyone know where Kirk Day has disappeared? Mail addressed to him at his last known connection — care of the Christian Science Publishing Company,



## 1917 Continued

Boston — has been returned. — RAYMOND STEVENS, *Secretary*, 30 Charles River Road, Cambridge, Mass. PHILIP E. HULBURD, *Assistant Secretary*, Phillips Exeter Academy, Exeter, N.H.

## 1918

Thanks are due Bill Wills for suggesting that the fellows send in word about themselves when sending their contributions for the Alumni Fund. Results are appearing at this early date. We quote from Ray Miller's letter: "My boys and I have just completed a little movie theater in my basement. I should like to have any '18 men who get to Swampscott look me up at 73 Fuller Avenue." (It must be remembered that Ray took colored movies of the twentieth reunion at Weekapaug, R.I., in 1938. They are very good, too. Your Secretary has seen them.) We go on with the letter: "Children? — Jack is nineteen and now at Governor Dummer Academy. He is going to the New England Aircraft School, Inc., at East Boston in July. Douglas is thirteen and in junior high school. Lois is nine and in grammar school — and the Brownies." Thanks, Ray.

Another fine note came from Paul Howard. You remember that both Paul and Al have sons being graduated from Technology this year. Paul's letter says: "I am happy to enclose my check for the Alumni Fund and to report that everything is well with the Howards. — Al and I are both located here in New England, running a couple of small manufacturing businesses which we own. Occasionally we see the '18 men located around Boston. Pete Strang dropped in to see me here at the plant recently, and Ira Young, of course, is associated with us here at the Weymouth Art Leather Company.

"Al has five children — Donald, Jean, Muriel, Arthur, and Norman. I have three — David, Priscilla, and Wallace. Donald and David are being graduated from Technology this year. Donald rows No. 4 on the varsity crew; Dave has been captain of the swimming team. Both will go into the Ordnance Department.

"Incidentally, I believe Gretchen has identified David as the class baby. If so, the fact that he is being graduated this year and his record might be of interest to the group. I am enclosing a summary of it copied from this year's 'Technique.'

"It certainly is interesting that our boys being graduated from the Institute this year are going out into the almost identical and unusual situation, as far as the world is concerned, as we found on our graduation. Let us hope the trouble does not last any longer and that it is permanently settled this time."

The record of David Howard follows: "David Wheeler Howard, . . . born March 14, 1919; Prepared at Winchester High School and Phillips Exeter Academy; Business and Engineering Administration; Dean's List 6; Field Day Marshal; Senior Week Committee; Scabbard and Blade (4); Swim Club (1, 2, 3, 4); Army Ordnance Association (2, 3, 4); Advanced R.O.T.C., Ordnance; Commuters' Club

(1); 150-lb. Crew (1, 2); Swimming (1, 2, 3), Captain (4); Wearer of the 'T'; M.I.T.A.A., Executive Committee (4); Field Day Crew (1); Entered Freshman Year."

From the Rotary International News Service came word that two graduates of M.I.T. were taking active parts in preparations for the thirty-second annual convention of Rotary International in Denver from June 15 to 20. The convention was expected to attract more than 10,000 Rotarians and their families. One of these two men is from the Class of 1892 and the other is our Fred P. Baker President of the Baker Truck Rental, Inc., who is a member of the house of friendship committee. Delegates to the Denver convention represent the majority of the 210,000 Rotarians and the 5,000 Rotary clubs of more than sixty countries of the world. (Wonder how many of the countries were really represented. Let us know, Fred.)

From a Washington paper of March 12 comes the following: "Carl B. Harper, a retired naval lieutenant who was seriously injured while testing a dive bomber, was selected today as special investigator of the Senate committee assigned to inquire into the recent air crashes which took 55 lives. Test pilot for the plane in which Col. Lindbergh and his wife flew around the world, graduate of M.I.T. and one time chief engineer of the Naval Aircraft Factory, Harper has had more than 2,000 hours of flying experience. . . . He served as aviation aide for the special Senate committees which investigated air mail contracts during the early days of the New Deal, the plane crash in which Senator Bronson Cutting, Republican of New Mexico, lost his life, and the munitions industry. . . ."

We are sorry to report the death of Frank H. Hopkins at his home in Brockton on May 11. Our sympathy goes to his wife and family. — GRETCHEN A. PALMER, *Secretary*, The Thomas School, The Wilson Road, Rowayton, Conn.

## 1919

With this July issue we wish you a pleasant summer and look forward to some interesting news of your vacation experiences for our next appearance in the November issue. Let's make next year a banner one for class notes.

Don Way writes: "Not much news. Busy as the devil; so is everybody else." His correct home address is 226 Wychwood Road, Westfield, N.J. — Howard H. Searles writes from 27 Norwood Street, Marlborough, Mass.: "Since graduation I have worked for the Bethlehem Steel Company at the Fore River Yard, Quincy, and taught in the apprentice school there; done commercial art work at Dennison Manufacturing Company; taken additional art courses at Boston and Columbia universities; been to Europe three times; and been teaching school for three years. This week I was appointed supervisor of drawing for the city of Marlborough." Congratulations, we wish you the best in your new undertaking.

Dean K. Webster, Jr., writes from Lawrence, Mass.: "Since 1920 I have been with the old established family business, H. K. Webster Company, founded in 1868, and am treasurer of the concern. My brother, Walter '23, is also with me in the active management of the business. We are engaged in manufacturing and distributing feeds for livestock in the New England states, and the business has grown to a considerable size. I am also treasurer of the New England By-Products Corporation of Boston, which is a national distributor of cod-liver oil and fish meal for the Gorton Pew Fisheries of Gloucester, Mass. I was married in 1924, and we have two children, a boy twelve and girl nine years old. I am a past master of the Ancient Free and Accepted Masons and a member of the Rotary Club."

Mrs. James H. Townsend writes that she was at Technology for only two months and wishes us to remove her name from our mailing list. — Jim Strobridge, 250 Park Avenue, New York City, writes: "No change. I'm still vice-president of Strobridge Lithographing Company (home office in Cincinnati) in charge of the New York office. I'm a major in the Engineer Corps Reserve, and expect to be called one of these days. I have been assigned to the Army Lithograph Plant in Washington where maps and other army lithographing are produced."

Henry S. Derby is a major in the United States Army and is stationed with the 71st Field Artillery Brigade, Fort Ethan Allen, Vt. — Herbert L. Duffy's address has changed from Cambridge, Mass., to Box 6, Sumner, Ill. — Donald H. Lovejoy has moved from Portland, Maine, and is at the Y.M.C.A., Middletown, Conn. — John W. Orcutt is now a lieutenant colonel with the Nansmond Ordnance Depot, Portsmouth, Va.

The new address of Albert B. Reynolds is 92 Hillcrest Avenue, Morristown, N.J. — The new address for Nobuo Yamamoto is 40 Kitabatake, Naka 2 Chome, Sumiyoshi-ku, Osaka, Japan. — Bernard S. Coleman broadcast on April 1 from Station WMCA, Knickerbocker Broadcasting Company, on the subject, "Tuberculosis on the Spot." — EUGENE R. SMOLEY, *Secretary*, The Lummus Company, 420 Lexington Avenue, New York, N.Y. GEORGE W. MCCREERY, *Assistant Secretary*, 131 Clarendon Street, Boston, Mass.

## 1921

Again we reach The Review's summer vacation period in which your Assistant Secretary will pause from his very pleasant twenty-year job of preparing these monthly columns. Beginning with the first issue of the new volume next November, The Review will go to a lot more of the Class, according to present indications, thanks to your support of the Alumni Fund. We certainly appreciate your fine support of the first call for the Fund last year and hope you will be well up in front on the band wagon this year.

Reunion and Alumni Day news of the Class must await the November issue of The Review. Interest in both events hit an all-time high this year and presages



well for future June meetings in Cambridge as well as for our Terrific Twenty-fifth, when the Class families will participate in our celebration for the first time. Ray St. Laurent deserves the heartiest praise for his thorough and efficient handling of this year's party. Thanks, too, to the many who have written such appreciative letters and who have otherwise participated in assuring the success of the milestone melee.

We enjoyed a surprise visit from Leigh J. McGrath, I, Vice-President of the Curle Manufacturing Company, Inc., of San Francisco, Calif., manufacturers of precision printing equipment. Mac was spending some time in the East in connection with a new development for producing accurate linotype slugs for use in high grade make-up work. He has a clever attachment for a linotype machine which automatically trims each slug to an accurate predetermined length, mills the ribs to a precise thickness, and even undercuts blank portions of the slug type edge to insure perfect stereotypes. Mac originally entered the construction field after the swimming team lost him in 1921, and later he went into the paper business. He terminated a long association with the Zellerbach Paper Company in May, 1940, to assume his present duties. Mac married Jean Flemming of Simmons, and they have two fine sons of fourteen and eleven years. He can be reached at home by addressing mail to Box 114, Aptos, Calif.

It is with a heavy heart that we record the passing of two of the Class, and our sincerest sympathy is extended to their families on behalf of the entire group. David Burger Joubert, V, who received his doctorate with us, died on October 23 at his home in Stellenbosch, South Africa. He was a lecturer in chemistry at the University of Stellenbosch, where his brother, J. M. Joubert '22, teaches.

Dennie Denison '11 writes that funeral services for John Paul Dean, I, were held on April 12 in the chapel of the United States Military Academy at West Point. Major Dean was killed on April 9 in a fall in Louisville, Ky., where he had recently been transferred. Born in Worcester, Mass., he entered Worcester Polytechnic Institute with the class of 1917, transferred to, and was graduated with honors from, West Point in 1918 and from Technology with our Class. From 1937 to 1941 he was assistant professor of philosophy at West Point. Previously he had served with the United States Army Engineer Corps in several sections of the country and had taken special courses at engineering, command, and general staff schools. He is survived by his mother, his widow, two sons, and four daughters.

Asher Z. Cohen, X, former Secretary-Treasurer of the Olson Preservative and Paint Corporation, Newark, N.J., has answered our last month's query with a complete account of his activities, of which the following is a part: "I am extremely disappointed that because of the present emergency I found myself unable to attend our twentieth reunion, towards which I looked with considera-

ble anticipation and enthusiasm. Uncle Sam decided to call me to active service from the reserve, and I have been assigned to command the 51st Ordnance Company located at the Delaware Ordnance Depot, Pedricktown, N.J. This is a regular army organization expanded to war strength through induction of selective service men. It is the only company on the post, so the schedule is a heavy one. Leading and watching these men at work and play, I am somehow pleasantly convinced that our country is as yet safe from the many 'isms' which are engulfing the major portion of this world." Good luck and best wishes, Asher.

Victor O. Homerberg, X, writes that he has been granted a leave of absence from his work as Professor of Physical Metallurgy at the Institute in order to devote his entire time to defense projects. — Paul L. Hanson, II, is sales manager of Heinz and Munschauer, Superior and Randall Streets, Buffalo, N.Y., manufacturers of refrigerators.

John J. Winn, Jr., X, sends a welcome letter to the effect that: "... I am positively green with envy of the fellows at the reunion in June. Once, for five minutes, I thought I was going to be able to make it. Then I knew that I couldn't, for I am now a member of the State Board of Education, which used to be the State Board for Vocational Education. Between that and the gas by-product industry (the latter is expanding rapidly), I am way over my head.

"I understand that my old friends Charlie Thornton and Whit Spaulding were up from Baltimore, though as far as I could learn, no one went from Oregon, and that is really a shame." Jack is commercial manager of the Portland Gas and Coke Company, located in the Public Service Building, Portland, Ore. He makes his home at 1949 Southwest Edgewood Road.

Recently announced United States Army advancements include the promotion to colonel from lieutenant colonel for Robert E. Guthrie, I, Coast Artillery Instructor, National Guard, Santa Fe, N.M.; to major from captain for Herbert B. Loper, I, Office of Chief of Engineers, Washington, D.C., and for James B. Newman, I, Ordnance Corps of Engineers, Washington, D.C.

Walter J. Hamburger, II, is the center of a feature article in the Boston *Herald* describing H. Schindler and Company, Inc., Canton, Mass., of which he is treasurer. The company, founded in 1887 as a manufacturer of silk violin strings, had the foresight to develop the application of silk strings as a better and less expensive substitute for split lamb gut in the stringing of tennis rackets. Production last year was over half a million 37-foot silk strings for such use, in addition to the manufacture of fishlines and dental floss. All of these products are processed completely from the raw silk. Even the dyeing of silks for racket strings and fishlines is done at the Canton plant, using the water of an adjacent pond which had originally been found adaptable to dye mixing some 120 years ago.

These new addresses have been received: Samuel F. Chalfin, II, American Machine and Foundry Company, 5520 Second Avenue, Brooklyn, N.Y.; Albert B. Clarkson, XV, 71 Lowell Street, Lexington, Mass.; Carl M. Cohen, X, 271 Madison Avenue, New York, N.Y.; Dr. Stewart P. Coleman, X, Room 2834, 30 Rockefeller Plaza, New York, N.Y.; John S. Cummings, VI, 1055 North 22d Street, Allentown, Pa.; Harold N. Ewertz, XIII, 212 Almur Lane, Wynnewood, Pa.; William H. Hopkins, Jr., XIII-A, 955 Atchison Street, Pasadena, Calif.; Robert F. Miller, XV, Room 1612, 19 West 44th Street, New York, N.Y.; Stuart Nixon, XV, 968 Second Street, Muskegon, Mich.; Charles M. Palmer, VI, 3101 North Hampton Street, Northwest, Washington, D.C.; Viviano L. Valdes, I, Avenue Insurgentes 734, Mexico City, Mexico; and Lieutenant Colonel Ludson D. Worsham, I, C. E. O. District Engineer, New Federal Building, Pittsburgh, Pa.

Every good wish to you all for a very pleasant summer. If you get that old wanderlust, drop in and see your Secretaries. Failing that, at least drop them a line and spill your news. So long until November. — RAYMOND A. ST. LAURENT, Secretary, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, Assistant Secretary, International Telephone and Radio Manufacturing Corporation, 137 Varick Street, New York, N.Y.

## 1922

The Army is surely getting some of our best people. Ken Merriam, professor of aerodynamics at Worcester Polytechnic Institute, is ordered to active duty for an indefinite period after school ends. Ken is a major in the Coast Artillery, United States Army Officers' Reserve Corps.

John W. Church writes that he is back in Pittsburgh after being away for ten years, and is technical director of Falk and Company, manufacturers of oils and synthetic resins. During his absence from Pittsburgh, Red has lived in Painesville, Ohio, and has been in the paint and pigment business. He promises to get to New York frequently to hold "a miniature reunion over something stronger than a cup of tea."

Yard Chittick has sent us a copy of Vol. 1, No. 1 of the *Condenser*, an informal house organ published by the Mutual Boiler Insurance Company of Boston. It is edited by William W. K. Freeman.

A press release from the executive offices of the Remington Arms Company, Inc., dated April 29, carries the very welcome news that Donald F. Carpenter has been elected a vice-president of the company and will continue in charge of all manufacturing and technical activities. Don went to work for E. I. du Pont de Nemours and Company after graduation, then after a couple of years became vice-president and general manager of the B. G. Carpenter Company of Wilkes-Barre, Pa. In 1927 he returned to the Du Pont organization as superintendent

1922 Continued

of the Leominster Viscoloid Works, later becoming works manager. In 1929 he was appointed general manager of the pyralin products department of Du Pont, and in July, 1933, he became director of manufacture of the Remington Arms Company at Bridgeport. Don is a vice-president of the American Management Association. He lives in Southport, Conn. He writes that he is pretty busy these days and "the whole organization is on the tight pulley and we have to get up before breakfast to keep the belt from squeaking. . . ."

Clyde P. Brockett wrote a very interesting letter from Arvida, Quebec. Clyde left New York about three years ago and is now safety engineer in the vitally important plant of the Aluminum Company of Canada, Ltd., at Arvida on the Saguenay River above Chicoutimi. It is needless to point out the responsibility that hangs on Brockett's shoulders, in view of the tremendous importance of this vital aluminum production plant in the defense picture of the British Empire. Clyde comments that a command of spoken French is highly desirable, if not positively necessary, and that with few exceptions he has found the native French workman richly endowed with a sense of humor and with a keen appreciation, often touching, for decent treatment and small kindnesses. He is rather noncommittal about the climate, making the comment that on May 11 it was snowing. He lives at the Saguenay Inn, a picture of which he enclosed. It certainly looks like an ideal spot for a vacation stopover, and Clyde highly recommends it. His mother and sister, who formerly lived in Rochester, N.Y., are now living in London, which is obviously cause for some concern. — CLAYTON D. GROVER, *Secretary*, Whitehead Metal Products Company, Inc., 303 West Tenth Street, New York, N.Y. C. YARDLEY CHITTICK, *Assistant Secretary*, 77 Franklin Street, Boston, Mass.

## 1923

I can't give the low-down on how many showed up for Alumni Day affairs, as the notes for this month are written a couple of weeks before that day. However, I can report that a handsome plaque, nearly five feet long and of durable and substantial metal construction, was erected on the inner wall of the garden donated by the Class to complete the Alumni Pool Building. The plaque bears the legend "Class of 1923 Garden."

Jack Keck reports that his health is still erratic, but it doesn't prevent him from turning up a few items of news. He says that New York had a peculiar accident that rated page one in the *Herald Tribune* on May 9. On the day before, the sidewalks of Madison Avenue, near 42d Street, during lunch hour were crowded with people from the offices of the Grand Central Terminal district. A taxicab chose this particular time to run wild. The driver claims he lost control, and the cab ran up on the sidewalk injuring several people quite seriously, among them Bill Searles. Bill lives in Scarsdale and has an

important position with the Tennessee Eastman Corporation, at 10 East 40th Street. He was taken to the Bellevue Hospital with a severe brain concussion.

Jack also prompted Lem Tremaine to report that he and Mrs. Tremaine will take their two-year-old offspring, Russell Ford Tremaine, on a western trip this summer. Lem's itinerary will start with Louisville and Chicago. In the Windy City they will visit Squibby and his family. Then their plans will take them to Glacier Park, Tacoma, and Seattle. The return trip will be made through Canada, from Vancouver to Lake Louise and Banff. From there they plan to go to Fort William on the western end of Lake Superior, where they will take the steamer through the Sault Ste. Marie to Port McNicoll on the eastern end of Georgian Bay, and then go by train through Toronto and Buffalo to their home. One purpose of the trip is to spend four weeks at Tacoma with Mrs. Tremaine's mother who is ill. — HORATIO L. BOND, *Secretary*, 457 Washington Street, Braintree, Mass., JOHN M. KECK, *Assistant Secretary*, 207 Bloomfield Avenue, Bloomfield, N.J.

## 1924

George Knight's recent letter for the Alumni Fund brought forth some interesting letters. One was from Hank Shore, who told a bit about his work in the patent department of the Radio Corporation of America. Hank reported bumping into Rock Hereford recently, when the latter was on one of his frequent trips from the West Coast. Rock reports that H. Royce Greatwood '25 is Secretary-Treasurer of the Technology Club of Southern California.

Another letter came from Dick Shea in Bridgeport, Conn., and told the Secretary off for not having more news in the class notes each month. Since this is the first word in many years from Dick, he is reminded that the Secretary cannot manufacture news, but he is always delighted to hear from members of the Class. Any others who feel that class notes are too brief can remedy that situation with a letter once in a while. Dick is a radio engineer for the General Electric Company and has been in Bridgeport for four years. He lives at 52 Stoneleigh Road and is the proud father of three daughters.

From Anatole Gruehr comes word that Bill Correale has won an important promotion, made by Mayor LaGuardia. Our congratulations to Anatole are in order.

Bill Rosenwald's picture was in the Stamford papers recently. The occasion was his visit there in behalf of the United Jewish Appeal. Bill is vice-chairman of the American Jewish Joint Distribution Committee, Inc., and president of the National Refugee Service, Inc. He is also president of the Rosenwald Family Association, a trustee of the Tuskegee State Normal and Industrial Institute, a trustee of the Museum of Science and Industry in Chicago, and a director of Sears Roebuck and Company.

We reported with regret the death on May 18 of Nathaniel P. Wharton, Boston patent attorney.

Jim Metcalf, last seen at a class reunion in Marblehead, is a partner in R. W. Beck, James I. Metcalf and Associates in Seattle. Jim flattered the Secretary with a list of bonds totalling \$48,000,000 which he has investigated, and on which he offers to report. — FRANCIS A. BARRETT, *General Secretary*, 50 Oliver Street, Boston, Mass.

## 1925

The columns of The Review can't, of course, be used to an unlimited extent as an address exchange, but from time to time an address change is sufficiently informative or provocative to warrant mention here. This statement is intended to introduce an offer by your Secretaries to send promptly the address of any member of the Class which is requested. Our file is made up to date as rapidly as the notices are received from the Alumni Association, and while they also would perform this service, there is no need of asking them to do it for us, especially as your letters containing such requests might also be used to send in items of interest concerning yourselves or others you have met. Furthermore, the Secretaries of all classes maintain an informal news service with each other, sending in letters or quotations concerning members of their respective classes to The Review Office for forwarding to the proper Secretary. Do not, therefore, confine your information to news about '25 men, but mention anything you may happen to know about other Alumni.

The most recent batch of address changes contains the following names: Henry Doble, X; Charles A. Giblin, IX-B; Bernard E. Groenewold, X; Frank R. Harris, I; Daniel H. Keck, XV; Ralph W. Lewis, I; Theodore Milne, V; Alfred K. Morgan, IX-B; John J. O'Brien, VI; Edward E. Piepho, VI-A; Elmer P. Ripatte, VI; Harry L. Stiles, II; Frank W. Warburton, VI; and Brandt W. Wilson, XIII-A. Anyone wishing any of their addresses, or any others, may have them by writing to the Secretary — especially if news is included with the request.

From James Coull, a professor and head of the chemical engineering department at the University of Pittsburgh, comes a letter sent him by Malcolm G. Davis, I: "I have your letter relaying to me the request of Hollis F. Ware, Secretary of the Class of '25. The most important piece of information I can give you about myself is that I left Pittsburgh to take a position as vice-president of the Atlantic Utility Service Corporation with offices at 61 Broadway, New York. The major scope of my activities will be in relation to rates and research in rate problems of the various operating properties of the Associated Gas and Electric Corporation. . . ."

Obie Denison '11 sent a clipping, under the heading, "Patton Resigns Academy Post." "Temple C. Patton, head of Physics Department at Worcester Academy, has tendered his resignation effective



## 1925 Continued

ptive in June to assume a position in private industry, according to an announcement today [April 30], by school officials. At the conclusion of the school year, Mr. Patton will join the staff of Babcock and Wilcox, Bayonne, N.J., as a research technician.

"Mr. Patton has been connected with Worcester Academy since 1934, coming to Worcester from M.I.T., where he taught physics from 1928 to 1933. He graduated from M.I.T. in 1925, also receiving the degree of master of science from the same institution. Following graduation he was connected with U. S. Rubber Company of Bristol, R.I., and International Paper Company, Glen Falls, N.Y." — Our thanks to Obie for the clipping, and congratulations to Temple on his new position.

From The Review comes this clipping from a Charlotte, N.C., paper: "A further step toward starting activities of the Charlotte district office of the Defense Contract Service, Office of Production Management, was taken when announcement was made that Francis E. Field [IV], of Asheville, was named manager with headquarters to be opened Monday in the Liberty Life Building. Mr. Field, a graduate of Massachusetts Institute of Technology, lately has been superintendent of the Asheville Mica Company of Biltmore. . . ."

This concludes our notes for the current volume of The Review. Please keep in touch with your Secretaries and make it possible for us to have notes in all nine issues of the 1941-1942 volume. If all goes as planned, your Secretary will be making a trip through Maryland, Virginia, and North Carolina early in October, with a possible side trip into Pennsylvania and New York. — HOLLIS F. WARE, *General Secretary*, 3 Aquavia Road, Medford, Mass. F. LEROY FOSTER, *Assistant Secretary*, Room 602, M.I.T., Cambridge, Mass.

## 1926

These notes will be cold veal when published, because they are written prior to the reunion and appear nearly a month after it, such being the exigencies of publication. We will limit ourselves therefore to a few odds and ends and to such important items as Bill River's return from India, Freddie Walsh's return from Europe, and the expectation that both of these members of the Class, whom we see all too infrequently, will have been at the reunion. Another notable foreign prospect who probably will have attended the reunion is S. M. Chu, who arrived late in May by clipper to become military attaché at the Chinese embassy in Washington. Chu, I believe, is our most advanced army officer. He holds the rank of major general in the Chinese Army and he has been minister of intelligence and propaganda in Chungking.

Let it be said here at this time that our fifteenth reunion has had extraordinarily able management under the chairmanship of George Smith. Herb Beckwith has served as treasurer; Pink Salmon has handled the publicity, with the help of Mac Bush, Don Cunningham, and Wes

Hemeon. Cedric Valentine took care of the arrangements with the hotel; Joe Levis and Bill Meehan, the sports program, and Flint Taylor, the entertainment. Bill Lowell contacted classmates in distant places, and Bud Wilbur has been a champion card miler and pinch hitter on a variety of activities. Since he had nothing to do with it, the Secretary can say without embarrassment that the publicity for this reunion has been about the best he has seen, and the whole affair was planned with a skill and energy that speaks well of the capacity of the Class to attract able men to its service. — JAMES R. KILLIAN, JR., *General Secretary*, Room 3-208, M.I.T., Cambridge, Mass.

## 1930

To Ted Riehl, X, and George Barker, V, the best wishes and congratulations of the Class are extended this month, as we conclude this volume of The Review. The Riehls became parents of a baby boy on February 20, and George was married to Ida Marie Johnson of Pittsburgh on March 21.

The Army continues to draw upon the talents of many of our classmates. Harold Conway, II, and Gilbert Cox were recently made majors. Newly appointed captains include Herb Ehr Gott, II, Bob Foster, VII, and Tom Wiczorek, X. Among those serving as lieutenants are Jim Biggane, XV, Al Carideo, II, Elliott Earl, IX-B, and Charlie Small, X. Another army man is Horace Myers, XV, but we do not know in just which rank he is serving Uncle Sam.

A year ago at this time we were back at work after having celebrated our ten-year reunion at Old Saybrook. The Class of '31 selected the same location this year, and we hope that its members enjoyed themselves there as much as we did! — Jack Bennett, II, in far-off Australia, joins me in wishing you all a very pleasant summer. Don't forget that I shall be most happy to hear from any or all of you in order that we may have a good fund of class notes in the fall. — PARKER H. STARRATT, *General Secretary*, Bradley Park Drive, Hingham, Mass.

## 1932

A year from this time our tenth reunion will be history. Ideas, suggestions, and offers of help for our tenth will be necessary if we as a group are to make our celebration a success. Al and Cissie Newcomb, whom we saw in Montclair recently, are being congratulated on the birth of their third daughter, Ellen Lee. — Dick Huesener called from New York one day, and we joined him for dinner. He is still working out of Pittsburgh as a combustion engineer. As he is not married, I gathered that he is considering a special assignment in the Ordnance Department.

From Charles E Locke '96, we received word that John Fellows has resigned from his position with the American Manganes Steel Division in Chicago Heights, Ill. He has taken a position with the metallurgical department of the American Brake Shoe and Foundry Company in Mahwah, N. J.

For the first time in these notes we have a report by the wife of a classmate. Now that we have a precedent, we hope to receive other contributions from the wives who read this. Mrs. Gaynor Langsdorf writes as follows: "As my husband is swamped in the process of writing his second master's thesis, I am taking it upon myself to tell you that he was chosen as one of eleven men, selected from companies all over the United States, to be awarded an Alfred P. Sloan Foundation fellowship for a year of study in business administration and economics at M.I.T. I think it is interesting that he is the only M.I.T. graduate ever to be made a Sloan fellow, and also that he is the only Sloan fellow ever to have an advanced degree. (He obtained his master's degree from the School of Chemical Engineering Practice in 1932.)"

"It is great to be back in Cambridge, and we have especially enjoyed using the beautiful new swimming pool. Our five-year-old daughter is going to be very proud to see her father receive his M.A. in June. Following graduation we will return to San Francisco, Calif., where Gaynor is employed by the Standard Oil Company. He has been on leave of absence this year from his duties as superintendent of the hydrogenation plant at the Richmond refinery of the company."

With these notes we will close our modest contribution to this volume of The Review. It will be the twentieth of September before we write again, but don't you wait that long. — CLARENCE M. CHASE, JR., *Secretary*, 1207 West 7th Street, Plainfield, N.J. CARROLL L. WILSON, *Assistant Secretary*, Research Corporation, 137 Newbury Street, Boston, Mass.

## 1933

Your Secretary received a pleasant surprise when he had a phone call from Dick Fossett, who is now working in Cincinnati. Dick was on his vacation and was passing through New York on his way north. He expects to be transferred to the Procter Gamble Company plant in Tennessee.

Our thanks go to T. C. Johnson for the following item, which was included in a note to Lou Flanders on the back of his Alumni Fund letter: "Eugene Rohman, XVI, writes me that he is assistant engineer in charge of aerodynamics for the Vega Airplane Company in Burbank, Calif. — Alfred G. Payne is with the Monsanto Chemical Company in Springfield, Mass. — I'm in charge of engineering training for the General Electric Company at Schenectady and so far have managed to get engaged. — I like your class notes — particularly the gossip." — We liked Lou's Fund notice, too, and hope you all do something about it.

Our congratulations go to Bretton Perry, who is engaged to E. Virginia Brown of Moorestown, N.J.; and to William M. Brobeck, who was married this spring to Jane C. Knox of Berkeley, Calif., where they expect to live.

We read that Samuel S. Saslaw is putting the students of the University of Miami through their paces in fundamental



1933 Continued

mathematics as part of the refresher courses being given in connection with national defense. — How about a little news, classmates? — **GEORGE HENNING, JR.**, *General Secretary*, Belmont Smelting and Refining Works, Inc., 330 Belmont Avenue, Brooklyn, N.Y. **ROBERT M. KIMBALL**, *Assistant Secretary*, Room 3-104, M.I.T., Cambridge, Mass.

## 1934

Hats off again, men, to that exceptional lady — Elizabeth MacGill. We have stood in awe at some of her past conquests, but now she has tackled, and mastered, a job that would do credit to the finest engineers in the country. The last achievement which we mentioned was the design and manufacture of the Maple Leaf trainer for the Mexican government. On the basis of that achievement she was handed a set of 3,600 blueprints and told to start making Hurricane fighters for the Royal Air Force. Here was a job that experts said could not be done. She had to start from scratch and tool up — designing and making the jigs and other equipment used to turn out the 25,000 parts of a finished plane. During the year that followed the arrival of the blueprints, she and a skeleton staff of 120 went to work installing new equipment, revamping old equipment, and instructing sailors, timber crews, and farmers in how to make airplane parts.

The skeleton staff has now grown to 4,500. The initial order, which was for forty planes, has been increased to an unlimited number. Production has been stepped up to twenty-three Hurricanes a week and is steadily increasing.

One of the requirements is that the Hurricanes built in Canada must have parts interchangeable with those made in Britain. That requirement necessitates most rigid tolerances in manufacture. When the first Hurricane was shipped to England, it was given the acid test to see if it lived up to this requirement. A wing was removed and put on a British-made plane. Then a chunk was taken out of the fuselage and a chunk made in England was fitted in. In both cases the part fitted perfectly.

Another triumph for Miss MacGill was the adoption by the British government of the de-icing equipment which she designed. She is certainly doing a magnificent job.

A report from Bath, Maine, informs us that John R. Newell has recently been elected a member of the board of directors of the Bath Iron Works Corporation. The company is engaged in building warcraft for the Navy. Nice going, John.

Louis Frank has recently given up his position as assistant general sales manager of the Dawson Distributing Company to serve a year with the United States Army Air Corps. He is a first lieutenant and has been assigned to the engineering production section at Wright Field, Dayton, Ohio.

George Merryweather was married on April 10 to Elinor Holton, daughter of Mr. and Mrs. Charles R. Holton of Bethlehem, Pa. Congratulations, George.

Well, fellows, I shall be looking forward to hearing from all of you before next September, so that we can start next year off right. — **JOHN G. CALLAN, JR.**, *General Secretary*, 184 Ames Street, Sharon, Mass. **ROBERT C. BECKER**, *Assistant Secretary*, Chile Copper Company, Chuquimata, Chile, S.A.

## 1935

Here are a few of the fellows who have joined Uncle Sam for a year: Paul Dove, Fort Douglas, Utah; Morry Goodhart, Mitchel Field, N.Y.; Stan Howard, Chicopee Falls, Mass.; George Hunt, Bridge-water, Mass.; John Mooring, Camp Stewart, Ga.; Brooks Morgan, Meridian, Miss.; and Chet Silver, Brooklyn, N.Y. — Charlie Small is now with the Kelly Sales Corporation in Arlington, Mass.

We have heard of a new arrival at the Murray Browns' — Alan Stuart was born on April 14. Congrats, Brownie. — Bernie Nelson stepped off the deep end on April 19. Jeff Farmer was best man. A week later Bernie returned from his honeymoon to take charge of a dance held by the M.I.T. Association of Buffalo. — Cohen meets Cohen! Paul Cohen and Pauline Cohen, of Dorchester, have announced their engagement. — Bob Glenn and Mary Williams of Danvers, Mass., have also pledged their troth.

Here's a bit of news picked up at the Buffalo dance — Carl Lavenas was in the States. He was married some time last October to Mary Sharpe, and on his honeymoon he called on Bernie Nelson. Carl was traveling through the country investigating and learning about irrigation projects on behalf of the Armo International Corporation and their South American developments.

Ken Holdom is the proud father of a son, Lindsay, who was born in June, 1940. (This item is a bit old, but it's new to the column.) Ken Finlayson also has a son, Duncan Kenneth, and is living in Hartsdale, N.Y. — Zay Curtis is engaged. I don't know who the future bride is. Can anybody help your Secretary out, including the prospective groom? We should have had some news here about Fish King, but the notes, taken under difficult conditions, were unintelligible later. We're sorry.

John and Mrs. Slosson had a blessed event. John is working for the Williams' Drop Forge Company, Buffalo. George Bull is now in Albion, N.Y., working on the installation of dial systems. — **ROBERT J. GRANBERG**, *General Secretary*, care of W. C. Voss, Old Town Road, Wellesley Farms, Mass. **RICHARD LAWRENCE**, *Assistant Secretary*, 111 Waban Hill Road, North, Chestnut Hill, Mass.

## 1937

The news this month is very brief. At Naugatuck, Conn., the engagement of Arthur M. York to Clare E. Peterson was announced, and at Lowell, Mass., the engagement of Charles E. Ryan to Loretta M. Casey. There is only one marriage, wonder of wonders. Seton S. Williams and Flossie Nell Hagan were married in Bisbee, Ariz.

Earl D. Fraser is steaming down in Montgomery, Ala., for the summer. He gives his address as 2 North Perry Street. "Just a note for the class notes," he starts excitedly. "I believe that the last time I appeared in the notes was in 1938, so I'll cover the ground since then: I received a degree of master of regional planning from the Harvard University Graduate School of Design, department of regional planning, in June, 1939. For the next year and ten months I worked with the Mississippi State Planning Commission (now the Board of Development) and the Federal Works Agency, W.P.A. The work consisted of technical and administrative supervision of city planning research projects, report writing, and some city planning design. The city of Biloxi, Miss., adopted a zoning ordinance and map prepared by yours truly. Altogether I worked in a dozen different cities and traveled on every highway in the state. About half the time I was stationed on the Mississippi Gulf Coast. The Coast is pushing both Florida and California in boasting of its climate as being ideal.

"Since the first of April I have been with the National Resources Planning Board's field office in Atlanta, Ga. I am working as a field consultant, doing city planning design and consultant work in communities affected by the emergency defense expansion programs. My current assignment is to the Coosa Valley defense area of Alabama. The work is done in co-operation with and through the Alabama State Planning Commission office in Montgomery, where I have desk space. — So far I haven't even received my draft questionnaire. In the local board where I am registered, 95 per cent of the boys are ahead of me. There is a possibility of my seeing Technology about the fifth of July. I hope to be able to see some of the IV and IV-B fellows, some of my former housemates, classmates, and so forth. I seldom see a Tech man that I know down here. — Am still single. My fairly permanent address is National Resources Planning Board, New Post Office Building, Atlanta, Ga." — Thanks, Earl. Let's hear from you again soon.

Al Woll has asked me to gracefully and honorably lift the roll of pappy from the burdened shoulders of Lou Pepperburg. To put it as Al did: "Is my face red! Is Lou Pepperburg's face red! After the May issue of The Review came out, my telephone began to buzz with Lou on the other end of the wire. He didn't threaten to sue me, but invited me up to his apartment to meet his wife and to prove that he was not a pappy as I had sadly misinformed The Review. There was no youngun about the apartment, so that proves Lou's point. . . .

"I informed you that Walter Haight was working for a casualty company that transferred him from Cleveland to Detroit. As far as I know Walter has never been employed by the Pioneer Asphalt Company, as was indicated in the notes. . . . I left the Pioneer on April 1 and took me for a vacation for a month. In that time I attended the American Chemical Society convention in St. Louis.

1937 Continued

Naturally I attended the Technology luncheon. Several professors well represented the Institute there. Those I could remember were: Arthur A. Blanchard '98, Thomas K. Sherwood '24, Ernst A. Hauser, and Robert C. Hockett. After lunch a wire from Elmer C. Wirtz, X, President of the Technology Club of St. Louis, was read. Elmer is shavetailing for Uncle Sam somewhere in the defense mechanism.

"I started a new position on May 5 with the Visking Corporation in Chicago. They manufacture sausage casings and other specialties made with cellulose. (It looks like cellophane, but it ain't.) My position here is strictly engineering, such as designing, constructing, and operating special control equipment applicable to the use of our casings. This certainly is a swell place to work.

"Kerry Arabian, who is also working for Uncle Sam, is in Edgewood Arsenal, Md. He is commanding officer of a contingent of drafted chemists and chemical engineers who render shell duds harmless. — Since Uncle Sam is now getting along famously, he thought that he was better off without me, and, therefore, has given me a 3-A classification. I sleep better now.

"Milton Lief married Rose E. Modest on June 8 in Boston. Milt is still with the Curtiss-Wright Corporation in St. Louis. — Art York to the contrary, I knew of Bill Penn's new position with the General Electric Company about two months ago. I certainly am glad that I moved Art to the ink so that he could write about himself and others, even if he did beat me to writing about Bill. I hope my writings move a few more fellows. Good luck, Art." — WINTHROP A. JOHNS, *General Secretary*, Route 1, Bele Meade, N.J.

## 1939

With apologies for the conspicuous absence of '39 in these coliums lately, your ramblin' reporter continues. The first item of importance is that the arrival of Mary Jane Wingard was heralded on April 5. We haven't heard from Doc yet as to whether she'll be in the class of '62, but we strongly suspect it. — Phil Bush wrote the following interesting letter: "As I read *The Review*, I'm duly impressed with all the news concerning our illustrious classmates and, really, to consider all that's printed, I guess my existence is a fairly dull one. I don't get 'hofbraued' more than once a month; I'm far from being engaged or married; and I'm not traveling all over the country like my X and XIII brethren — but, hang it all, I live in God's country, have been skiing every winter week end, and during the week I have an hour's sunbath and a poker game every day during lunchtime. I'm a national defense worker, spending my time as a rolling-mill metallurgist for the Columbia Steel Company. There is no need to tell you that steel is king now, and at times I'm at the plant for stretches of thirty to thirty-five hours. — So solly, Molly; come west, suckers. Any of you fortunate creatures who come to San Francisco are cordially invited to

phone me and partake of a few free meals at 1857 Broadway Street."

Gene Thatcher, who was with us back in our freshman days, wrote: "I just received *The Review* and, feeling not a little ashamed at getting so much pleasure from the class notes and not contributing any myself, thought I'd break down and give you a few low-downs about my own whereabouts and doings.

"Prior to last August I spent my time at various work in the utility field, on construction, maintenance, personnel, and safety. In August I started to work for the A.B. Chance Company in Kansas City, Mo., as a field engineer. My job deals entirely with live-line work; we design and build tools to handle all the problems that present themselves in live-line maintenance on all voltages from 2,300 volts to 220 kilovolts. My activities are confined to that little territory that lies between the Sault Ste. Marie, Mich., to San Diego, Calif., and from New Orleans to Seattle. Oh yes, I'm married; my wife travels with me. My main worry is the fear that I'll get soft from spending my winters in the South and my summers in the North; but it's nice.

"When I get down to Rio Valley next winter I may go out and keep Bill Beer company atop that tower; and perhaps I'll be able to help him out on that liquid situation too."

Rudy Soria, VI-C, has written that he now has a part-time assistantship at the Illinois Institute of Technology in Chicago. Rudy likes everything about Chicago except the size. He says: "It takes about a half hour to get from here to the center of town, and we are only thirty-three blocks south. I think there are 130 blocks south altogether. The school is quite a change after M.I.T.; physically it is smaller, although the enrollment is about the same. My work consists of teaching in evening school once a week a class in fundamentals of electricity (two hours of lab and two hours of lecture) to men in industry who want to get some notion of electricity."

From Pete Bernays we hear that Joe Zallen, V, is in the Army; latest address: First Battalion, 180 Field Artillery, Camp Edwards, Mass. Pete also said that Bill Postman, V, is at the Calco Chemical division of American Cyanamid and Chemical Corporation in Bound Brook, N.J. Mr. and Mrs. Harold Snow are the proud parents of a baby girl born on February 19. Pete himself is studying for the various examinations associated with becoming a doctor. He will spend the summer at a Reserve Officers' Training Corps camp.

And, all the way from South America, Harlow Reed wrote: "I have been intending to write for some time and now during a temporary period of being flat on my back in the hospital, I'm finally getting around to it. I've enjoyed reading *The Review* immensely, although it is usually a bit antique when it arrives here.

"I have been in Chile a little over a year now, with the Chile Exploration Company, a subsidiary of the Anaconda Wire and Cable Company. I spent six

months previously with the Phelps Dodge Refining Corporation at Laurel Hill, L.I. This Chilean plant, commonly known as 'Chuqui' is at the world's largest copper deposit (plug) from which some four hundred million pounds of copper are taken annually. The ore is chiefly sulphate, and the metallurgical process mostly electrolytic deposition. Up to the present time I have been one-half of the research department, working chiefly on an experimental lead smelter, but when I leave the hospital I am to be transferred to the copper smelter as a metallurgist.

"There are about one hundred gringos here, and the majority of the technical men are from western schools. The company employs some 20,000 Chileans, so you can see it is a rather large outfit. We are about 10,000 feet up on the Chilean *pampa*, about one hundred kilometers from the main Andean cordillera. This *pampa* is very different from the Argentine one and is actually dryer than the Sahara desert. Our big sport is polo, although I don't suppose we would make Westbury turn green with envy."

Aaron White wrote: "If I were the only Course Secretary who shirked his duty, I'd feel awfully ashamed, but judging from the scarcity of news in the class notes, I haven't been the only one, and that makes me 'one of the boys.' You may be interested in the line-up of '39 men who are at the Aberdeen Proving Ground, Md., on active duty as ordnance officers. As of March 31 the list includes: Bill Brewster, Louis Castleman, Phil Constance, John Crankshaw, Zeke Losco, Burns Magruder, Win Reed, and Hal Seykota. Things being as they are, I suspect that this list by now has been greatly augmented. But I won't know until I hear from my *Gestapo* again. I am no longer on the staff of the Institute. I left in June, 1940, to take a position as junior metallurgist in the Watertown Arsenal. I think that I'll be kept in civilian clothes and that I will not be allowed, because of my job, to go on active ordnance duty. . . ."

From Irv Peskoe we hear that: "For nigh onto two years I've leisurely conned the '39 section of the class notes. It's been a good job of editing, too. But now my conscience has turned on me. I have a blank paper before me, and I'm sworn to desecrate it with my ravings.

"On March 16 I entered a partnership with Beatrice Meyers of Manchester, N.H. Simultaneously I quit a boring government job and came back home to Long Branch, N.J., in order to go to work for the old man in his business of jobbing automobile accessories, replacement parts, and equipment. Hence, it's Long Branch for the calculable future, or until Uncle Sam finds a uniform for me.

"Howie Schachman and Dave Morgenstern shared Crafts 303 with me. The former, after casting about for well over a year and meeting enough rebuffs to have flattened most of us, finally hit on a spot. He's with the Rockefeller Institute in Princeton, working for Dr. Stanley and Dr. Lauffer, famed for tobacco virus discoveries. He is really doing a good job there, too, and is contemplating work in



physical chemistry at the Harvard Medical School.

"Dave Morgenstern has bounced over most of the Southwest. He can now be reached at Evansville, Ind., at which point he is a mastermind for the Continental Oil Company. By now Dave is a real petroleum expert, and he needs an assistant to beat off the women with a club.

"During courting days I dated Bea in Boston. On one of these excursions I was lucky enough to catch Sol Baker and his Sandra just one day before their ceremony. They're settled somewhere near Hartford, Conn. She's as good natured as he is, so you can realize how well they get along. Word arrives from Sol that Joe Bayer is at the Philadelphia Navy Yard. "On other trips I bumped into Leonard Jaffe, the boy wizard. He's a junior engineer at Watertown Arsenal and a Harvard student (bless his soul) in his spare hours. He'll soon have a doctor's degree in metallurgy. Jack Summers, the old squash and tennis coach at Technology, reported that Billy Babcock was married to a New Jersey girl on March 15, which was one day before my wedding.

"Last summer I was a salesman in Red Bank, N.J., palling with machinists, mechanics, gas-station operators, and other prospective buyers of auto parts. My spare time was devoted to puzzling on the universe. There are few answers as yet, but my old chums helped put me right on many a problem. I've always been a bit rebellious — at Tech I even did a thesis entitled, 'The Engineer and the Nonspecialist Student at M.I.T.,' largely, I feel now, so that I could take a few cracks at the established order. After knocking around a bit, however, it was inevitable that I become more placid (and, incidentally, more selfish). Gone now are the old dreams of feeding the share croppers. In their place I mooch hot dogs from my boy scouts on wienie roasts.

"During the summer a surprise phone call from Charley Friedman, just two days after Burns Magruder left for Louisiana and the Standard Oil Company, led to two swell reunions. Charley was stationed at Fort Monmouth as a junior engineer, with Martin Lindenburg and Sam Hutchins. A week after Charley's call I went to Washington to work for the Department of Labor as — of all things — a junior economist. There, for over five months, I rubbed elbows with political-science and economics majors from Harvard, Columbia, and points west. We spent our evenings talking about politics, social sciences, and history. My apartment mates were holders of masters degrees from Ohio State and Columbia universities, respectively. Imagine a Technology man in this predicament! I got a real kick out of every minute of it, however, since my tastes always did run in these directions.

"In the District I encountered, among others, Al Horton '36, Dick Bloomberg, and Delbert L. Rhind, Bursar of the Institute. From various friends I received word that Sears Williams is at the Glenn L. Martin Company in Baltimore, Myron

Cantor is at the Wright Aeronautical Corporation in Buffalo, and Art Quint is at Fort Monmouth, N.J.

"While Bea and I honeymooned on one of the Florida keys, it occurred to me that Paul Sokoloff lived at Coral Gables, so I rang his house on the way back. His mother told me that he had been married just a week before, and that he lives, at the present time, in Baltimore, Md. . . ."

Ed True wrote as follows: "As I am so far from home, I follow with unusual interest your accounts of the activities of the members of the Class. . . . I wish to bring you to task for one thing — that is, in the November issue of *The Review*, you mentioned the marriage of Ryder Pratt, and a few lines later you told of my engagement. It happens that I was married more than a month before Ryder. And I believe that I wrote you soon after arriving here in Oregon, and told you about my marriage, my trip, and my visit with Ryder in Oak Park before his marriage.

"Oh, well, maybe I didn't write that letter; I can't really remember. However, I did get married on August 31; I did take a 6,000-mile motor trip through seventeen states, from Maine to California; and I did visit Ryder at his home in Oak Park. After a turn through New England we went across New York to Niagara Falls, then to Cleveland, Chicago, across Iowa, Nebraska, and into Wyoming. We visited Salt Lake City, Bryce Canyon, Zion National Park, Grand Canyon, and then went across Nevada to the gold mining district of California, along the Redwood Drive, and to Crater Lake in Oregon. It was as magnificent a trip as I ever hope to take.

"The dean of the School of Architecture and Allied Arts here at the University of Oregon is Ellis F. Lawrence '01, a Technology man. At the time of his graduation he was president of his Class. The other members of the staff either went to the Institute or took their graduate work there, so I feel right at home." — STUART PAIGE, *General Secretary*, Box 207, Greenwich, Conn. ROBERT C. CASSELMAN, *Assistant Secretary*, Apartment 37W, 1200 Massachusetts Avenue, Cambridge, Mass.

## 1941

Yep, here's the latest from the Institute, and we've got soap behind our ears. It is the first appearance of '41 in the class notes section; we hope we are here to stay. It is still a bit early for any letters, so your Secretary had to send out scouts to learn the probable whereabouts and doings of the various class members.

It seems that everybody and his brother is going into the Army, or is trying to stay out of it. Nobody "knows for sure," everybody "expects a letter any day now." Very few of the men have been taken or have been threatened with being taken by the draft. It seems that the country has at last caught on to the fact that Technology men will be of more use working in industry than shouldering a gun in the Army. Among the men who have not taken the advanced course of the

Reserve Officers' Training Corps at the Institute are many who know where they will be located next year, although the exact addresses are uncertain at this time. Bob Demartini will be working for a textile mill in Connecticut. Les Corsa and Ralph Hunt will draw pay from the American Can Company in Brooklyn, N.Y. Al Riehl is at Harrison Radiator Corporation, Lockport, N.Y. Paul Cushman is a General Electric man operating at Schenectady, N.Y. Bill Hargens is helping with national defense at Lockheed Aircraft Corporation, Burbank, Calif. Bill was worried about not knowing anybody out that way; apparently he solved his problem by getting married on June 14; luck, Bill. Warren Myers is doing time at a watch factory back in his home state of Illinois.

The R.O.T.C. men are the ones who know least of all where they are going. Some expect deferment through the war pool, some because of studies, some because of flat feet. In any event, the probable locations given to me are very probable indeed and must all be taken accordingly. Linde Air Products Company at Newark, N.J., seems to like '41 men; four are going there — Irv Foote, Ed Murphy, Henry Pohndorf, and Johnny Sexton. Union Carbide Company had drawn Les Gott to Niagara Falls. It would hardly do for a trip to Niagara to go wasted, reasoned Les, and so he and Alice Betinas were married on June 15; best wishes, Les.

A clipping from the *Boston Traveler* revealed that Alan Hill and Virginia Sprague of Newton were to be married in June. Many other men are tying the permanent knot, but we just haven't heard who they are; we'd appreciate a notice. — We'll print every one we get.

The back-to-school group is headed by Bill Cadogan, Bill Folberth, Joe Gavin, and Larry Turnock, who are hoping for army deferment. (Larry was one of the first to receive deferment.) Leo Farr, Gardner Ketchum, Ed Kispert, Bob Mayer, and your Assistant Secretary, Bill Ahrendt, will stick it out another year on the banks of the Charles.

We've mentioned some men at aircraft plants; building planes seems to be the thing now. Pratt and Whitney at East Hartford, Conn., has called Frank Walker. The Glenn L. Martin Company in Baltimore, Md., has Ray Krieger and Art Lowell, while Chet Hasert will be with the Curtiss Wright Corporation in Buffalo, N.Y.

Ships, too, are playing an important part in national defense, and a number of '41 men are taking part. Bill Fox and Fred Davies are going to Quincy to Bethlehem's yard at Fore River. Kirk Miller and Charlie Kalman are going down to help Karl D. Fernstrom '10, M.I.T. Professor of Business Management, at the North Carolina Ship Building Company. The Aluminum Company of America in New Kensington, Pa., has attracted Don Howard and Carl Mueller. Don't ask us where we got this information; our next issue will probably be taken up with retractions.



At the American Smelting and Refining Company, Perth Amboy, N.J., we find Bill Hooper and Ken Spaulding; at the Carnegie-Illinois Steel Corporation, Pittsburgh, Pa., Irv Koss and Joe Myers; at Colgate-Palmolive-Peet Company, Newark, N.J., Dave Howard (who must have taken seriously that talk about Lever Brothers); at Du Pont, Howie Morrison; at Carboloy Co., Inc., in Detroit, Ed Engle; at Brewster Aeronautical Corp., Long Island City, Phil Freeman. A deep breath!

Roommates Lew Jester and John Mullen are going to stick it out together at General Electric in Lynn. Frank Langhammer is at American Machine and Foundry Company, Brooklyn, N.Y. Fred Whitaker is going to handle fire-chief gas, for the Texas Company, New York City. Dirk Van Dongen and Walt Threadgill will be at the Dravo Corporation in busy Pittsburgh. Jack Horner is at the Chrysler Corporation, Detroit, while Clif Muzzey goes to competitor General Motors in the same city.

Leon LaBombard will be in a pleasant little town in Connecticut which has a mountain in main street. Company? New Departure Bearing, of course; it's Bristol. Sol Goldfarb is in Washington, D.C., as a civilian in the ordnance department. Sandy Glick is out west (well, west of Boston) in Springfield at the Monsanto Chemical Company. Joseph Bowman is at the Union Sulfur Company in New York, while Carl Stewart is working on the railroad — to be exact, the Pennsylvania Railroad.

And now for the biggest employer of Institute men, Uncle Sam: *Army*: Bud Ackerson, Cap Adelson, R. Wilson Blake, Eugene Lawrence, Conrad Nelson (at Wright Field, Dayton, Ohio), Howie Samuels, Ed Sherburne, Jim Thornton, Walt Turansky, Ted Walkowicz, and, I think, your Secretary. *Navy*: Rog Blum, Paul Carlson, Bill Compton, Dick Cottrell, Eugene Crawford, Bob Franz, Alfred Furtek, Glen Guernesey, Ted Guething, Clif Hahn, Ed Hardway, Dick Herr, Steve James, Vitaut Janulevicius, Steve Kinney, Camille Kosztyla, Jack Ludwig, Robert Montana, Muller Moody, Myron Phillips, Ken Roe, Frank Sexton, Howard Wade, and Walt Willey.

A formal list of names and addresses will be shipped to you some time in September. You realize, of course, that we cannot compile an accurate list if you don't let the Alumni Office know your permanent new address, to say nothing of the poor chances of your ever getting a list if your address is unknown. So get on the ball and let us know where you are living and what you are doing. By the time the next issue is out we'll know the addresses of the various Course Secretaries, and we'll have them printed. — STANLEY BACKER, *General Secretary*, 46 Bicknell Street, Dorchester, Mass. WILLIAM R. AHRENDT, *Assistant Secretary*, The Graduate House, M.I.T., Cambridge, Mass.

## 1887

The necrology of the Class has been enlarged during recent weeks by the inclusion of the names of William H. Brainerd of Wellesley, Mass., and Dwight Brainerd of Montreal. The former was one of our most regular attendants at reunions; the latter, more remote from the scene of activities, was seen infrequently.

Although his health had been none too robust of late, William H. appears to have passed away quite suddenly. His last letter was one to the Secretary. It had been started only two or three days before his death on May 8, and was destined never to be completed. The following obituary is from the Boston *Globe* of May 8: "William H. Brainerd, 79, well known in local circles for his civic work and an active partner in the architectural firm of Brainerd and Leeds for thirty years until his retirement in 1932, died . . . at his home, 10 Upland Road, Wellesley. He was born in Halifax, Mass., April 1, 1862, and was graduated from Iowa College, now known as Grinnell College, in the Class of 1883 and later attended the Massachusetts Institute of Technology as a member of the Class of 1887. After being associated with various architectural firms for approximately ten years he founded the firm of Brainerd and Leeds in 1905 which continued until 1927, after which he had various other partners until his final retirement in 1932. Mr. Brainerd designed more than fifty schools throughout New England and many other public and private buildings. He was architect for the Ford building on Beacon Hill, the New England Historic Genealogical Society, the New England Home for Little Wanderers, the Salvation Army Building in Roxbury, the Newton Y.M.C.A., the Christian Endeavor Building and several churches and school buildings in Greater Boston and the city proper. He was the sole surviving incorporator of the Boston Floating Hospital and at the annual meeting of the corporation in January last, after having served forty years as trustee and clerk of the board and corporation, was, at his own request, relieved of his duties as clerk, but was re-elected a trustee. Active in town affairs, he was a member of the Park Commission for nine years and of the Planning Board at the time of its organization some twenty years ago. In addition to this particular service to the town he was on the committee which wrote the original building law and on the various committees which revised it from time to time. During the first World War he was in charge of shipyard construction in Philadelphia. He was a member of the New England Historic Genealogical Society, the Phi Beta Kappa, the American Congregational Association and the Puddingstone Club. He leaves a wife and a son, Henry B., of Wellesley. . . ." Giles Taintor, President, and Winthrop Cole, Vice-President, represented the Class at the funeral services. William

## THE TECHNOLOGY REVIEW

was buried in Halifax, Mass., back of the old church where his father was the minister at the time of his birth.

Your Secretary received a letter from Harry Brainerd in which he announces the death of Dwight: "My brother Dwight died at his home in Montreal on April 20. He was born in 1865 in an army tent at Little Rock, Ark., where his father was stationed after serving as a surgeon through the Civil War. His father later gave up his medical practice and entered the powder business. The family lived in Montclair, N.J., until Dwight was twelve, and then moved to Montreal. Dwight eventually became president of the Hamilton Powder Company, retiring from business about thirty years ago. Since then his winters were often spent in the South and his summers at Edgartown, Martha's Vineyard, Mass. His recreations consisted largely of shooting, fishing, and flower gardening. Dwight was unmarried."

A few lines from Frank Brett at his delightful old colonial manor in Duxbury indicates that he is enjoying the good weather and is as busy as usual with his garden. — Another of the Class whom we would all like to see is Henry W. Holt, Justice of the Supreme Court of Appeals of Virginia. He regretted his inability to meet with us in June but sent his best wishes to his classmates. Recent communications from Lonsdale Green and Dick Schmidt in Chicago expressed their regrets at their inability to come east for the reunion in June. The latter wrote: "One or two days' contact is hardly more than 'hello-good-by.' I wish we were to be together for three or four days this year, so that I could have a chat with each one present. Five-year intervals are too long at our age. Another reason that keeps me in the Chicago area is that my firm has been, and is, so busy that I have to work ten hours a day for five days of every week as senior partner in a busy firm of architects and engineers and as commissioner of buildings of the city of Chicago. We have built quite a lot of industrial buildings; others are in prospect, as are large hospitals in Denver and Bogotá, Colombia, a 250-room nurses' residence in Chicago, and quite important additions to hospitals in a dozen cities in the Middle West and South. Working continuously apparently has agreed with me, inasmuch as I will have been at it sixty years next September. I started as an apprentice draftsman in '81; went to Technology in '83, and worked during vacations. Best wishes and kindest regards to all of our Class."

Your Secretary would suggest that in view of the fact that these notes are the last until November, you can render great assistance by submitting for the delectation of our readers such narrations of travel or summer sports or other interesting matter as you may experience. — NATHANIEL T. VERY, *Secretary*, 15 Dearborn Street, Salem, Mass.

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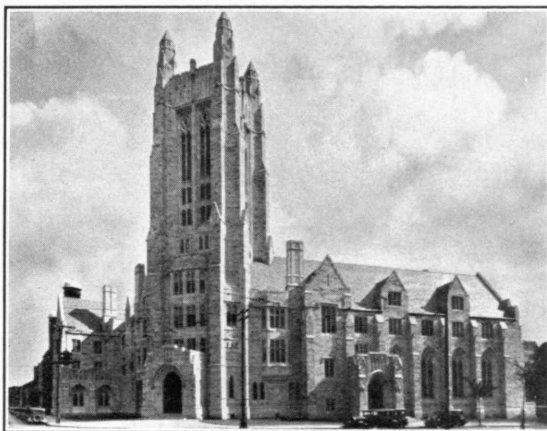
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# Maybe yours isn't here . . . but

## Here's what the users say... about the STROBOTAC



The Strobotacs and the Strobolux which we have used for speed measurements. They are ideally suited to our application because we measure speeds in the range of 5,000 to 30,000 r.p.m. on devices of a very low power output. Before your Strobotac was available, we used home-made stroboscopes, mechanical stroboscopes and vibration tachometers. None of these were entirely suitable for our work and your equipment has greatly simplified our speed measuring problem.

Most of our uses are strictly conventional devices, such as observing the speed of rotating parts, governor springs on rotating devices, etc.

The particular interesting use we are making of the Strobotac consists in observing the action of piston rings in the engine through a window in the cylinder walls at about, or slightly below the lower limit of travel of the upper ring. Through this window we can watch the action of any of the rings. This is particularly valuable in our work.

So far, the usage of the equipment has been confined to checking the RPM of frequency generating equipment for communication systems and, in addition, observations of brush performances on railway and Edison system converters.

You no doubt know that we manufacture fans, blowers and motors. The Strobotac has been indispensable on some of the tests we had to take. If there are any holes that you can suggest we would be glad to fill.

Our largest application is in checking small synchronous motors. The final shaft of the motor gear reductions are loaded until the high speed rotor just begins "slipping" its poles. Observation is very simple under Strobotac illumination. Several "make-bands" that you can suggest we would be glad to fill.

We believe that our uses of the Strobotac are only of the standard type in using them to measure speed and reconnection. As we make only motors of the very smallest type, naturally this is the only means we have of measuring speed and we find the use of this instrument indispensable.

On the use of the Strobotac. At the present time, we are using the instrument in routine checks of certain interfering parts. We have also used the instrument in some checks of the proper point of application of oiling systems supplying some high speed mechanisms.

Our main application of the Strobotac has been in measuring the amplitude of vibration on several setups which are required for Air Corps tests. Increasing emphasis is being placed on the effect of vibration, and up to the present time we have found the Strobotac to be the most suitable instrument for studying and measuring such vibration.

that we are using the Strobotac instrument as a tachometer for determining the speed of work rolls, discs, motors and the like in equipment used for the manufacture of seamless tubes. Separately, we have made some attempt to use the instrument for determining the speed of work rolls, discs, motors and the like in equipment used for the manufacture of seamless tubes.

We find many other general uses such as checking amplitude vibration in belt clippings, "hunting" of high speed geared shafts - in general any periodic motion which can be studied with it.

We use the Strobotac principally for the measuring of the R.P.M. of small motors such as Heater and defroster motors used in automobiles and similar motors where it is impossible to use a tachometer because of inaccessibility and the load variation caused by the tachometer.

Although the uses to which we put the Strobotac are very common we consider them very valuable in our test department.

checking the speed of rotating elements having the shaft end closed in so it was impossible to use the ordinary tachometer.

It is used to measure the speed of small motors and rotating shafts with a torque too small to measure the speed directly. We hope this is the information which you are looking for.

We are using these instruments at the present time in connection with the study of vibration in fan and blower blades, as well as in the study of eddy currents around various parts of the fans and blowers, such as blades, spokes, etc.

you might be interested in knowing that your Strobotac and Strobolux have been used by us to good advantage for observing the high speed application of paper tape to fine copper conductors. This is done at a speed of several thousand R.P.M. and it is of interest to see just how the tape is actually formed to a tube at the point of application.

Another of our applications is setting governors on our governor controlled motors driving our commutator type signal generators. The Strobotac is used generally in checking this place of superlativity for us. In the case of synchronous drives, synchronous speed and accelerating the same for gear, belt, and governor units, constant absolute speed is desired, and our Strobotac has been instrumental in perfecting this piece of equipment.

sold to the aviation industry must be capable of withstanding a vibration test of ten times gravity. We use our Strobotac to watch the action of relays and switches during this test. The Strobotac is a valuable piece of equipment.

In addition to the uses in vibration studies we have several in our engineering laboratory for studying not only speed but vibration, surface speeds of contacting parts, slip between friction driven members and other uses almost too numerous to mention.

I hope this information on our use of your General Radio Strobotac and Strobolux will be as useful to you as these instruments have been to us. I am sure you will find them valuable.

We have six of your Strobotacs in continual use. Two of the Strobotacs are used in our Electrical Laboratory principally for measurements of motor speeds in our design and development work on small motors. Two others are in daily use in our Mechanical Laboratory where they are applied principally to speed measurements on fans, and agitators.

Another on our largest Turbo-generator we were able to observe the condition of the collector rings while grinding and while running. We did not have to shut it down and start it up as formerly.

We frequently have occasion to test the "bounce" in relay contacts of various kinds. We have found that by rotating a small black disc with a white arrow on the end of a motor shaft and then connecting the contacts under test to the Strobotac that we can get a very good picture of the contact "bounce". This method has the advantage of being extremely simple and easy to set up and operate.

YOUR APPLICATION of the STROBOTAC may not appear in these actual comments from users . . . but there IS a STROBOTAC use for you if you have to observe the operation of any machine revolving even as fast as 100,000 rpm, or if you have use for a highly accurate electrical tachometer which requires no electrical or mechanical connection with the machine being measured. The price? Only \$95.00.

● Write for Bulletin 713 for Information

GENERAL RADIO COMPANY • Cambridge, Massachusetts

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